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JPRS 84340

16 September 1983

# USSR Report

ENERGY

No. 160

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ERRATUM: This article republished from  
JPRS 83708 of 17 June 1983 No 152 of  
this series pp 1-4 to make certain  
translation changes.

## OIL AND GAS

UDC 553.981.002.2(575.4)

### OIL AND GAS INDUSTRY DEVELOPMENTS NOTED

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 83 pp 11-12

[Article by M. Kh. Khusnutdinov, Deputy USSR Minister of Construction of Oil and Gas Enterprises: "New Gas Condensate Deposit in Turkmenia"; bold text shown in //]

[Text] The further expansion of our country's gas industry is inseparably tied to the development of new deposits in not only regions of West Siberia and the Far North but also the sands of the Karakum Desert, in Turkmenia.

Pursuant to the decisions of the 25th and 26th CPSU congresses, eastern Turkmenia has become the site of large-scale exploration and development of new gas deposits and construction of pipelines carrying gas to the country's center. During the 11th Five-Year Plan alone gas extraction in eastern Turkmenia is scheduled to reach about 14 billion cu m, and the organizations of the Minneftegazstroy [Ministry of Construction of Oil and Gas Enterprises] should, jointly with the deposit operators, on allowing for the natural decrease of extraction in "old" deposits, construct facilities for the extraction of tens of billions of cubic meters of gas per year.

The ministry's collectives in 1982 were posed the task of constructing the Dauletabad Gas Condensate Deposit. This deposit lies in the center of a waterless desert. The region's climate is continental, with a mean annual temperature of 14 degrees Centigrade and an absolute minimum of -20 degrees Centigrade in December and maximum of 49 degrees Centigrade in July. The mean annual precipitation is 240 mm and the vegetation is typically desert and semi-desert. There is practically no developed road network.

The integral approach to developing this new gas deposit was largely determined by the number and nature of the facilities needed for a normal operation of the first gas-processing installation with a capacity of 5 billion cu m per year.

The subsector's organizations had the task of implementing, within a period of less than one year, along with preparatory work, a complex whole of operations to build industrial facilities, communications systems, motor vehicle roads and even cultural and consumer facilities along with housing. The construction of Dauletabad included the installation of borehole equipment and the construction of a comprehensive gas treatment installation (CGTI) along with a 1,420-mm diameter trunk gas pipeline and trunk gas-condensate pipeline.

Those taking part in building the complex included not only the suppliers of materials and structural elements but also the collectives of the Glavtruboprovodstroy [Main Administration for Pipeline Construction], the Glavneftegaz-elektrospetsstroy [Main Administration for Special Oil, Gas and Power Construction], the Glavneftegazmontazh [Main Administration for the Installation of Oil and Gas Facilities], the Turkmenneftegazstroy [Turkmen Oil and Gas Construction Association], the Soyuzpodvodtruboprovodstroy [All-Union Association for Pipeline Construction], the Shatlykgazstroy [Shatlyk Gas Field Construction Trust], the Sredazneftegazmontazh [Central Asian Oil and Gas Installation Trust], the Sredazneftegazstroy [Central Asian Oil and Gas Construction Trust], the Gazmontazhавтоматика [Trust for the Automation of Gas Industry], the Vostokneftegazelektrospetsstroy [Eastern Oil, Gas and Power Special Construction Trust] and the Vostokpodvodtruboprovodstroy [Eastern Underwater Pipeline Construction Trust].

Production pace-setters attained a high rate and quality of the construction of not only the trunk gas pipeline but also gas-field structures and other facilities of the complex.

A major role in shortening the construction schedule was also played by the utilization of the advantages of specialized conduct of the principal types of construction and installation operations and particularly of the specialization of subdivisions within a single (unified) organization.

The Shatlykgazstroy Trust of the Turkmenneftegazstroy Association was designated as the prime contractor building the gas deposit. Technological equipment was installed by specialized organizations of the Sredazneftegazmontazh Trust. Engineering facilities (a complex of water-intake structures, a power station, a boiler plant along with the needed utility networks) were built by a specialized subdivision of the Shatlykgazstroy Trust. The installation of means of communication and automation was performed by organizations of the Glavneftegazelektrospetsstroy.

The 1,420-mm trunk gas pipeline was built by the Sredazneftegazstroy Trust of the Glavtruboprovodstroy through a streamlined technological process. The climate and terrain along the route of the pipeline required extensive planning work associated with the special features of pipeline construction in the desert regions of our country. Throughout the 140-km route of the pipeline it was necessary to level sand-hills down to the subsoil.

The gas deposit was built on utilizing the definite advantages of modular construction. Prefabricated modular buildings developed by the Proyektneftegazspetsmontazh Special Design Bureau were installed along with standardized structural elements and products on allowing for local conditions and the requirements of the construction and installation organizations.

Construction on the CGTI [Comprehensive Gas Treatment Installation] site included the installation of input lines and facilities for the purification and dehumidification of gas preparation of condensate, recovery of diethylene glycol (DEG) and preparation of the corrosion inhibitor.

The equipment for the gas purifying and dehumidifying facility was installed in modular form. The facility includes four technological lines with a capacity of 5 million cu m/daily each, and it consists of the following equipment: first- and second-stage separator units, measuring unit and low-temperature separator unit; air cooler; gas-to-water cooler, two gas-to-gas heat exchanger units. In

addition, measurements and reduction of gas for house needs are performed on the CGTI site. To prevent hydrate formation, an 80-percent solution of DEG is injected ahead of the gas-to-gas heat exchanger.

The condensate preparing facility is designed to separate the saturated 70-percent solution of DEG from the condensate. The facility includes three separating tanks, a mesh-type gas separator and collecting tanks for the condensate.

The DEG recovery unit is designed to recover from gas condensate 70-80 percent concentration and consists of: direct-fire vaporizer, mesh-type gas separator, emergency drainage tank and a series of collection tanks.

The facility for preparing the corrosion inhibitor is also designed to store the inhibitor. It consists of reservoir tanks and the needed pump equipment.

The high stratal and pit temperatures and the high content of carbon dioxide (up to 3.3 percent) result in intensified corrosion of carbon steels, and hence gas intake from wells is accomplished by means of compressor-pump pipe, with the corrosion inhibitor being supplied in the spaces among pipes to the well bottom by means of centralized control from the CGTI via mains installed parallel to gas lines from the wells to the CGTI.

The Dauletabad-Shatlyk trunk condensed-gas pipeline is designed to carry the condensate to the stabilization facility at the current main structure No 1 on the Shatlyk Deposit. It was laid parallel to the Dauletabad-Shatlyk gas pipeline, along the same technological corridor. The construction of both the trunk gas pipeline and the condensate pipeline was completed at the same time as the complex whole of operations to provide electrochemical protection.

An innovative and creative approach to problem-solving when putting the new facilities into operation was strikingly displayed by the collectives of the Vostokpodvodtruboprovodstroy Trust, which within a short period of time had laid four underwater pipelines across the navigable Karakum Canal, including a pipeline measuring 1,420 mm in diameter and about 400 m in length.

In addition to the technological facilities, also built were auxiliary, repair and storage and maintenance facilities as well as motor vehicle roads.

The status of this project was of unremitting concern to the Mary Oblast Turkmen CP Committee and the executive committee of the oblast Soviet of people's deputies.

Continuous assistance to the builders was provided by the Turkmen CP Central Committee, its secretaries and the republic Council of Ministers, and not just in solving economic or organizational problems at that. Lively ideological-upbringing work was organized on construction sectors and lecturers, propagandists, agitators and stage and screen artists as well as amateur artists came to the construction site. The collective efforts and the coordination of the activities of party and Soviet workers and economic managers produced good fruit. The first facility of the new Dauletabad Gas Deposit has started operating. Hundreds of millions of cubic meters of Dauletabad gas entered the country's unified gas transportation network—to serve the national economy.

The growth of the industrial potential of our state requires a corresponding growth in energy generation. As known, during the current Five-Year Plan the demand for fuel-energy resources will increase markedly. Tremendous attention was paid to fuel-energy problems at the November (1982) Plenum of the CPSU Central Committee. The quality of performance of the fuel-energy subsectors and the development of the country's oil and gas complex will largely decide the growth rate of the national economy and hence also the welfare of the Soviet people.

The expansion of capacities of the Daulatabad Deposit and the activation of additional facilities there represent a weighty contribution of the toilers of our subsector to the implementation of the historic decisions of the 26th CPSU Congress.

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CSO: 1822/222



ERRATUM: This article republished  
from JPRS 83708 of 17 June 1983  
No 152 of this series pp 5-7 to  
make certain translation changes.

## OIL AND GAS

### SOCIALIST PLEDGES OF OIL AND GAS WORKERS FOR 1983

Moscow STROITEL'STVO TRUBOPROVODOV in Russian No 4, Apr 83 pp 13-15

[Unsigned article: "Socialist Pledges of the Collectives of Organizations and Enterprises of the Ministry of Construction of Oil and Gas Industry Enterprises for 1983"]

[Text] Fulfilling the historic decisions of the 26th CPSU Congress, the subsector's workers are speeding up the rate of the construction of oil and gas industry facilities and tenaciously struggling to improve efficiency of production and quality of performance.

Competing for a worthy welcome of the 60th anniversary of the USSR, the subsector's collectives achieved in 1982 a marked increase in the rate and effectiveness of construction. Of the six gas pipelines envisaged in the five-year plan for linking West Siberia with the Central USSR, the Urengoy-Moscow and Urengoy-Petrovsk trunk gas pipelines were built ahead of schedule and reached their designed capacity in the same year in which they were put into operation. The Urengoy-Novoposkov gas pipeline was completed on schedule, with its segments being successively put into operation. Much work was also done for the oil industry.

The activated capacities assured reaching the 500-billion cu m yearly target and overfulfilling the planned volume targets for the extraction of gas and shipments of crude oil.

The program for construction and installation operations by subcontractors for the first two years of the five-year plan was fulfilled ahead of schedule, on 6 December 1982. The tasks of increasing labor productivity were overfulfilled. A major contribution was made to implementing the program for social services to the collectives working in the country's oil and gas complex.

The workers of the Ministry's organizations and enterprises, like the entire Soviet people, unanimously supporting the domestic and foreign policies of the Communist party, responded with ardent approval to the resolution of the November (1982) CPSU Central Committee Plenum and the decisions of the 7th session of the USSR Supreme Soviet.

Treating as a militant program of action the directives of comrade Yu. V. Andropov, Secretary General of the CPSU Central Committee, the subsector's workers launched the socialist competition for a pre-term fulfillment of 1983 plan

targets on the basis of intensification of production, maximum exploitation of existing potential and strengthening of plan, technological and work discipline. Further, they are adopting the following socialist pledges:

In view of the exceptional economic and political importance of the Urengoy-Pomary-Uzhgorod export gas pipeline, successive activation of segments of that pipeline will be assured for the main administrations, trusts and technological flowlines.

The construction of compressor stations with 16,000- and 25,000 kv capacity units will be regarded as one of the most responsible and decisive directions of work and initiated this year. Twenty-two compressor stations along the Urengoy-Novopskov gas pipeline will be put into operation and their designed capacity will be attained ahead of schedule. Along the Urengoy-Pomary-Uzhgorod gas pipeline the Verkhnekazym'sk and Pomary compressor stations will be put into operation in June 1983; the Urengoy and Komsomol'sk stations, in October; and the remaining priority stations, in December. Preparations will be completed for opening an additional 13 compressor stations in the first quarter of 1984. The activation of the compressor stations should be concurrent with the construction of housing and socio-cultural facilities for their personnel.

The construction of the Urengoy-Central USSR trunk gas pipeline (first segment) will be launched on a broad front. Line work on the swampy sectors will be completed before the onset of the spring thaw and altogether at least 1,500 km of the route will be laid by year end.

At the Urengoy condensate-gas deposit comprehensive gas treatment facilities No 8, 9, 10 and IAS will be put into operation along with 200 km of inter-field and 200 km of intra-field gas collector pipe. At the Sovetabad and Uchadzhik deposits comprehensive gas treatment facilities with capacities of 5 and 3 billion cu m per year will be put into operation. The targets for equipping the Karachaganak and Astrakhan' gas deposits will be fulfilled and preparatory work will be started on the Yamburg Deposit.

For the oil industry, facilities assuring the fulfillment of the oil and gas extraction targets will be put into operation. In West Siberia, six new deposits will be constructed and crude oil processing facilities with a yearly capacity of 27 million tons will be put into operation along with pump stations having an aggregate daily pumping capacity of 135,000 cu m, cluster stations with aggregate daily capacity of 166,400 cu m and seven gas-lift complexes.

The successive opening of segments of the Kholmogory-Kuznetsk oil pipeline with an overall length of at least 500 km will be assured; of this length, 320 km will be handled by organizations of the Glavtyumentruboprovodstroy [Main Tyumen' Pipeline Construction Administration] and 196 by organizations of the Glavvostok-truboprovodstroy [Main Eastern Pipeline Construction Administration].

Jointly with the USSR Goskomnefteprodukt [State Committee for Petroleum Products] priority segments of the following petroleum products pipelines will be completed ahead of schedule: Lisichansk-Trudovoye-Donetsk-Zhdanov, Novki-Ryazan'-Tula-Orel and Nikol'skoye-Voronezh.

Under the program for the construction of housing and communal facilities, dwelling area aggregating at least 2 million sq m will be built along with schools

designed for an enrollment of 17,200 children, preschools for at least 10,000 children, hospitals aggregating 850 beds and polyclinics accommodating 2,135 visits.

The development and introduction into production of new machines, materials and automated systems will be continued. A prototype model of a fully operating excavator with a drive of up to 735.5 kv and a special rotor drive for operation in permafrost soils will be built. The production in 1983 of at least 12 mobile air-cushion installation units will be organized. Design specifications for 10 automatic manipulators (industrial robots) to be introduced in the subsector will be drafted and transmitted in the second quarter of the year to the specialized ministries.

The use of electric contact welding on oil and gas fields will be broadened and this welding technique will be used in building up to 3,000 km of gas-deposit and gas-lift pipelines. A prototype of mobile installation for the electric contact welding of 114-325 mm diameter pipe will be developed and built. Jointly with the Institute of Electric Welding imeni Ye. O. Paton, a prototype of an electric contact welding machine for welding curved sections of large-diameter pipe will be developed.

A variety of measures will be taken to develop and introduce new types of transport, that are ready for immediate use after construction. Two continuous-flow conveyor systems for inert materials will be built and installed at the Reinforced Concrete Plant of the Surgut House Building Combine. The development of the new automatic "Turbotrans" system for the transportation of bulk materials will be completed and the system released for use in the national economy.

The further development of modular construction will be assured and large-panel housing construction will be expanded in capacity and its utilization increased to 77 percent. The Serpukhov KSK [expansion unknown, but apparently a prefabricated housing plant] will produce 2,800 interlocking sections of complete sets of buildings. The Oktyabr'skiy Plant will fabricate structural metal elements for 2,700 VZhK [expansion unknown] container modules, including 14 complete sets of maintenance and repair modules.

Further improvement in the quality of construction of, especially, trunk pipelines will be assured. The successive introduction, beginning in 1983, of a set of standards for quality control of the construction of main gas pipelines at construction trusts and for construction flowcharts will be developed and organized. Quality control of trunk gas pipeline weldments by means of gamma- and x-ray flaw detection techniques will be expanded.

Measures to introduce at organizations and enterprises a rigorous conservation program and economical management will be implemented. The following quantities will be thus saved: 25,000 tons of rolled stock, 82,000 tons of cement and 86,300 cu m of lumber, along with 32,000 tons of standard fuel, 60 million kwh of electrical energy and 76,000 gigajoules of thermal energy.

An active part will be taken in implementing the Food Program. Capacities for 8.2 million rubles of production will be put into operation at the Belebeyevskiy Livestock Machinery Plant in Bashkir ASSR, along with capacities for processing 120 tons of oleaginous seeds daily at the Bayram-Aliyskiy Oil and Fats Combine in the Turkmen SSR, hothouses aggregating 6 hectares in area at the Mayskiy Hothouse Combine in the Tatar ASSR and a complex of facilities for raising 100,000 brood hens of the Podbel'skiy Poultry Factory in Kuybyshev Oblast.

On subsidiary farms of the subsector's enterprises facilities will be built for raising a total of 1,200 head of large horned cattle, 5,000 hogs and 2,000 sheep. At least 1,500 tons of meat and 1,000 tons of milk will be supplied to workers from these subsidiary farms.

A complex whole of measures will be implemented to expand social services for the subsector's personnel. Thus, 461,000 sq m of dwelling area and preschools with an enrollment of 2,260 will be built for that personnel. Manual employment will be reduced by 3,500 and labor safety will be improved. Advanced training courses will be provided for at least 20 percent of construction brigade leaders and 76,000 workers will be given regular and advanced skills training.

The 1983 program for subcontractor construction and installation operations will be completed ahead of schedule on 29 December. The planned labor productivity will be exceeded.

A resolute struggle will be declared against loss of work time, absenteeism, high personnel turnover and lawbreakers. A more demanding atmosphere as regards adherence to discipline will be created at every workstation.

Further development of the brigade combined-skills forms of the organization and stimulation of labor toward end-results will be assured, and the remuneration of workers, engineers and technicians engaged in flowchart-type operations will be coordinated on the basis of a broad application of the brigade-order and Shche-

kinskiy method principles. In 1983 at least 47 percent of the volume of construction and installation operations will be performed on brigade-order basis.

The mass scale and effectiveness of socialist competition will be expanded, the forms and methods of its organization will be improved, advanced knowhow and valuable initiatives and deeds of the collectives winning the competition and production innovators will be widely disseminated.

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The workers, engineers, technicians and staffs of the organizations and enterprises of the Ministry of Construction of Oil and Gas Industry Enterprises assure the Leninist Central Committee of the party and the Soviet government that they shall apply all their effort, knowledge and experience to the successful accomplishment of the tasks posed by the November (1982) CPSU Central Committee Plenum and mark the year 1983 with new feats of labor.

/These socialist pledges were discussed and adopted by the collectives of organizations and enterprises and approved by the Collegium of the Ministry of Construction of Enterprises of Oil and Gas Industry as well as by the Presidium of the Central Council of the Trade Union of Oil and Gas Industry Workers /.

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CSO: 1822/222

ERRATUM: This article republished from  
JPRS 83708 of 17 June 1983 No 152 of  
this series pp 8-9 to make certain  
translation changes.

## OIL AND GAS

### YAMBURG WORKERS STILL CALLING FOR HELP

Moscow SOVETSKAYA ROSSIYA in Russian 16 Jan 83 p 1

[Article by I. Ognev: "Yamburg Is Waiting"]

[Text] More and more often the name Yamburg is appearing along with the names of the gas fields Medvezh'ye and Urengoy. One year ago a detachment of specialists from the Nadymgazprom [Nadym Gas Industry] Association was sent there, to the shores of the Taz Peninsula. In March of last year the newspaper told about the first steps taken to develop this gas condensate deposit. The report called the attention of USSR Gosplan, the Ministry of Gas Industry, and several other ministries to the problems that were slowing down work. Only the USSR Ministry and Gas Industry responded to the published article.

From the letter signed by deputy minister A. Kolotilin, it follows that solutions to most of the problems related to the new deposit had been envisioned by a January decree of the board of directors before the newspaper article appeared. A year has passed. The interdepartmental commission of USSR Gosplan on questions of the development of the West Siberian petroleum-gas complex recently analyzed the course of construction at Yamburg. They found that this very important project is still not on the itemized list of construction projects for the five-year plan. The Ministry of Gas Industry did not mention this fact in its response.

In January the collegium of the Ministry of Gas Industry decreed, according to the letter to the editors by the deputy minister, that Yuzhniigiprogaz [possibly State All-Union Scientific Research and Design Institute for gas pipelines and gas industry enterprises in southern regions], the general designer, should complete the plan for construction at the deposit, singling out the first phase, by 15 April 1982. But preparation of the design documents is dragging on unforgivably.

Among the factors that are holding up design workers difficulties with financing were mentioned; there is still no cost estimate. This is not surprising, for the project is not included in the five-year plan. In attracting partners Yuzhniigiprogaz is forced to use bank credit and its own ceilings, and this is not enough. The general designer has to lower its standards with respect to partners. For example, the Leningrad designers who are doing the community at Yamburg are orienting their plans to one of the series of buildings of the Nadym Building Construction Combine. But of all the social and domestic facilities, this series has only nursery schools.

Once again the platitude has been confirmed: one inevitably runs into particular problems until the general ones are solved. Among these general problems the newspaper included preparing a program for construction and working the deposit. In its response to the editors the Ministry of Gas Industry did not mention this important question. Is the ministry, as the client, taking the necessary steps today to coordinate the efforts of its partners? It appears that it is not.

For example, the problems of working out a transportation plan to deliver freight to the Yamburg deposit are still under lively discussion at all levels. The money spent for trips by numerous commissions to the polar region would easily have covered the cost of this document. There is no doubt that the freight flow will be intensive; river workers alone cannot handle it. The opinion of the Gosplan interdepartmental commission and the people invited to speak at its session was unanimous: there must be a railroad to the deposit. But the necessary decisions have not been made. The answer of the Ministry of Gas Industry did not say anything about the position of power workers either.

The northern workers express a cherished dream: just once they would like to see all the involved ministries working at the deposit on time. But this is difficult. It is not chance that neither RFSFR Ministry of the River Fleet, nor the Ministry of Power and Electrification, nor the Ministry of Transportation Construction, nor the Ministry of Construction of Petroleum and Gas Industry Enterprises has yet answered the article in SOVETSKAYA ROSSIYA. But silence or formalistic answers will not help Yamburg.

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CSO: 1822/244

ERRATUM: This BRIEF republished from  
JPRS 83708 of 17 June 1983 No 152 of  
this series p 15 to change a place  
name.

## OIL AND GAS

### BRIEFS

OIL PIPELINE CONSTRUCTION--Kizner, Udmurt ASSR--One more hot spot has appeared on the line of the Urengoy-Uzhgorod oil and gas pipeline. It's located in Udmurtia, near the rayon center of Kizner. A base has been established there to weld pipe into 30-meter sections. Construction workers from the Ufa Vostoknefteprovodstroy [Eastern Petroleum Pipeline Construction] Trust are working in shock fashion. They are erecting residential buildings, a dining hall, and other service facilities, as well as various warehouses. At the same time the welding area is being outfitted. When it is launched it will accelerate the advance of technological flow unit No 11 along the line. This unit is to lay the pipeline in the segment between the Kama and Vyatka rivers. The labor collectives are striving to complete work on this segment of the great gas pipeline ahead of schedule [By A. Sabirov] [Text] [Moscow IZVESTIYA in Russian 13 Feb 83 p 2] 11176

CSO: 1822/244

ERRATUM: This article republished from  
JPRS 83708 of 17 June 1983 No 152 of  
this series pp 18-26 to make certain  
translation changes.

## NON-NUCLEAR POWER

### TAJIK HYDROELECTRIC POWER CONSTRUCTION NOTED

#### Rogunskaya GES Construction Report

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 24 Mar 83 p3

[Article by K. Perdakis, director of Rogunskaya GES [Hydroelectric Power Station] Project, and B. Karpov, chief engineer, Rogungesstroy [Rogunskaya GES Construction Administration]: "Designing: Pluses and Minuses" under the rubric "On Major Construction Sites: Rogunskaya GES"]

[Text] /The decisions of the 26th party congress outline the further development of hydroelectric power in the Eastern USSR, especially in Tajikistan. The Basic Directions state: "Expedite the Construction of Rogunskaya GES...." / [printed in boldface]

/On the Vaksh, in the region of the future largest hydroelectric station in Central Asia with the world's tallest dam, work is under way on the vast construction site and its approaches. Despite the difficult conditions, roads are being laid, quarries are being worked and tunneling operations have been commenced. The first houses and utilities have been completed in the future town of Rogun./

The general designer for this project is the Central Asian Affiliate [SAO] of the Hidroproyekt [All-Union Planning, Surveying and Scientific Research Institute imeni S. Ya. Zhuk] which, like the other affiliates and departments of that Institute across the country, needs no special recommendation. The SAOGidroproyekt had designed in the republics of Soviet Central Asia such unique hydroelectric power stations as Golovnaya and Nurekskaya on the Vakhsh Toktogul'skaya on the Naryn and the Tuyamun Hydraulic Engineering Structure on the Amu-Dar'ya. These and other stations and hydraulic engineering works basically solved the problems of irrigation and power supply in the republics of Soviet Central Asia. The Rogunskaya GES will assure a further increase in power generation and the development of irrigated farming in Turkmenistan, Uzbekistan and Tajikistan.

The subcontractors working with the SAOGidroproyekt include a number of other design exploration and research and design institutes in this country. For example, the city of Rogun is being designed by the Tadzhikgiprostroy [Tajik State Planning and Design Institute for Construction]. The SAOGidroproyekt and its subcontractors accomplished a huge amount of work in developing the blueprints for the Rogunskaya GES, which were approved in 1980.

The hydroelectric power station and the town are being built under complex geological-topographic and climate conditions in a seismically active region. This means that the designers as well as the builders and the customer have to be extremely competent in engineering matters and must be experienced, capable of



acting operatively and ready for any technical or operational complications. Quite naturally, on such complex construction projects as the Rogunskaya GES a special role is assigned to designers and assisting prospectors.

In our opinion, the progress of the design work at present lags behind the required construction schedule. Hence we decided to express our views on certain problems that have long since become urgent.

Owing to the particularly complex conditions of building the Rogunskaya GES, the SAOGidroproyekt has set up an on-site design division (OPG), as had been done previously on the site of the Nurekskaya GES. The division has the task of on-site provision of design documents and blueprints, supervising the operations to see that they conform with the designs, operatively resolving the technical design problems arising in the course of construction, and in general revising the blueprints and cost estimates as the need arises.

The Nurek experience has shown that the better-staffed and equipped the on-site design division is, the more rapidly and competently the technical and design problems arising on the construction site are resolved. To this end, the division must include strong teams for drafting operational blueprints and cost estimates. But the Rogunskaya GES on-site design division, established as far back as in 1977, has an extremely small staff of about 45 persons and still has not been complemented with qualified experts. Thus while it had basically coped with the task of the drafting and approval of the engineering project, the SAOGidroproyekt did not prove adequately prepared for on-site design and the commencement and expansion of construction and installation operations.

Consider the Nurek experience. There, during the same stage of construction, three on-site design divisions had already been set up: one from the main institute with a staff of about 50-60, another from the SAOGidroproyekt with a staff of more than 60, and the third from the Gidrospetsproyekt [All-Union Design and Planning Institute for Special Construction] with a staff of 25-30. The first and third divisions chiefly attended to drafting projects for the conduct of operations. Thus, the total number of designers working directly on the construction site of the Nurekskaya GES during the 5th to 7th years of that project was about 140. Let us add that they were strong not only in number but in high qualifications and scope of competences.

Compared with Nurek, the Rogunskaya GES is in an underprivileged position. The main Moscow institute of the Gidroproyekt does not even maintain an office in Rogun, believing that its Central Asian Affiliate can handle everything. The team from the Gidrospetsproyekt institute consists of only seven experts, which is very little. Altogether, not many more than 50 designers work in Rogun. As a result, designers often lag behind the needs of the construction site, whereas it would seem necessary to utilize the positive experience of Nurek broadly and boldly.

On the whole, the site is supplied with the needed design documents and blueprints, since these are provided not only by the on-site design division. But the design institutes are located so far from it that they often are unfamiliar with regional features and hence the on-site design division has many corrections to perform, and lags behind the progress of construction.

Mention must be made of the considerable lag until recently on the part of the team for drafting the operational designs of the principal structures of the

hydroelectric power project. This team is justly termed the engineering brain of construction, expected to explore the optimal solutions in complex situations and foresee the progress of operations for at least a year ahead.

Of the total volume of operations about 40 percent will have to be performed underground. These are being handled by the Gidrospeksstroy [State Institute for the Design and Planning of Special Hydrotechnical Construction]. As mentioned above, the Gidrospeksstroy has organized an on-site design division with a staff of seven experts, but can such a small staff handle the design work associated with such a volume of operations? Of course, no.

Such an important matter as the formation of an architectural team within the on-site design division has not yet been resolved either. Let us consider again the experience of Nurek. The credit for the amenities, neatness, comforts, greenery and architecture of that young city in Tajikistan belongs chiefly to the team of architects within the Nurek on-site design division, to their demanding attitude and tenacity.

The staff of the Tadzhikspetsstroy Institute includes enthusiasts devoted to the new town of Rogun. They are working on its architecture willingly and competently. But there are no representatives of that institute on the construction site, which lacks architectural supervision at that. Insofar as we know, there are people at that institute who would like to come and work on the construction site as members of the on-site design division, and the institute's administration is not opposed to dispatching them to Rogun. But this matter has not been resolved for years owing to the lack of the needed travel funds at the Tadzhikspetsstroy. Its resolution depends on the republic's Gosstroy, Gosplan and Ministry of Finance. It has to be resolved in the immediate future considering that the construction of Rogun is in full swing and it is high time to attend to housing amenities for the pioneer settlement of the project builders. Since the Tadzhikspetsstroy is in charge of the design of Rogun, it should maintain on the site its own group of experts, including architects for an operative solution of various questions.

We hope that the Gidroproyekt Institute imeni S. Ya. Zhuk will pay due attention to the status of design work on the construction site of the Rogunskaya GES.

We also think it necessary that the departments of the SAOGidroproyekt should improve their performance, especially the electrical-engineering, cost-estimate and operational design, and road and bridge departments. Their liaison with the project at present leaves much to be desired. Strange as it may seem, the chief project engineer of the Rogunskaya GES is an extremely rare visitor on the site.

The construction of the energy colossus on the Vakhsh has entered upon a new stage. Work is under way on a broad front to block the river in 1985 and divert its waters through underground tunnels so as to bypass the dam-building area. A period is coming when all the project participants will have to exert greater effort and cooperation among all the subdivisions and teams will have to be smoothly coordinated. At that stage the designers will act as the project's engineering brain. It is thus necessary to strengthen both the construction subdivisions and services of the customer and the design teams operating directly on the site.

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 1 Feb 83 p 2

[Article by I. Savchenkov, Chief, Rogunskaya GES Project: "Much Has To Be Successfully Accomplished" under the rubric "On Major Construction Projects: Rogunskaya GES"]

[Text] To the builders of the Rogunskaya GES the past year was a stage of further consolidation of the base-building collective and expansion of the scope of operations. A number of facilities was erected, including a school for 1,176 children, substations in Ordzhonikidzeabad and Obigarma and purification facilities. The first four residential buildings in the settlement of Rogun were completed, a kindergarten is under construction, and the school was established. More than 200 families are settling in new apartments.

On the whole, the Rogungesstroy [Rogun GES Construction Trust] fulfilled its program for construction and installation operations by 100.7 percent, which meant a 9.5-percent increase compared with the preceding year. This was chiefly accomplished owing to excavation and housing-construction operations. The plan for release of completed facilities was overfulfilled. Such are the chief indicators for last year.

However, we did not fulfill all our targets. The construction of the principal parts of the underground complex could not be expanded. Our main subcontractor, the Construction Administration of the Gidrospetsstroy, has achieved no major progress in tunnel excavation. Only 3.8 million rubles of operations was performed instead of the scheduled 5. Some increase has been achieved, but it hardly deserves serious mention considering that this year's program for the Gidrospetsstroy already provides for 7 million rubles! Because the main subcontractor is marking time, the scheduled damming of the Vaksh in 1985 is in danger.

The geological conditions of Rogun are very complex, with some of the rock strata through which tunneling is done being soft and liable to flooding. The tunneling requires all sorts of equipment: drilling machinery, rock loaders, concrete laying machinery and auxiliary equipment. If any of these types of equipment is missing, tunneling rate slows down sharply. Drilling and concrete-laying equipment could be found. But rock loaders and auxiliary equipment have long since become worn.

For this reason the mean rate of excavation of construction tunnel No 1 has been about 20 linear meters per month. The brigade of Yu. Shul'ga works in that tunnel. He is an experienced and serious brigade leader who has passed through the school of Nurek. Although the brigade includes many novices, highly skilled foremen are its backbone. A similar situation exists in other collectives headed by the experienced brigade leaders A. Podol'skiy and Yu. Chichendayev. This means that the problem is not that of cadres but rather of providing the brigades with all needed equipment and organizing the work so that it will bear fruit.

Another urgent question is material supplies for the Rogun division of the Gidrospetsstroy. Last year our materials supplier, the Production-Technological Supply Administration [UPTK] of the Tadzhikgidroenergostroy [Tajik Hydroelectric Power Construction Trust] did not provide us with sufficient rolled metal, reinforcements and lumber. The reinforced concrete plant and the house building combine undersupplied us with ventilation ducts and this too slowed down the tunneling rate.

The tunnelers also had often to suspend operations owing to the lack of various oils, especially spindle oil, and spare parts for tunneling equipment as well as special materials and products supplied to them by the Gidrospetsstroy administration. Considerable delays were caused by lack of transport for removal of rocks and delivery of concrete.

Unless the above problems are solved, accelerating the tunneling rate in 1983 will not be possible. And yet, in some tunnel sectors it is already necessary to reach a monthly excavation rate of 40 linear meters--twice as many as last year's monthly rate. I emphasize that this must be done in the existing sectors, because at present they number 13 but only six are being worked. During the first half of this year two more sectors will be opened. They require equipment and manpower.

The main task of the Gidrospetsstroy this year is to extend the No 1 and 2 tunnel trenches to the Vakhsh River and thus enable the Gidromontazh [State All-Union Hydrotechnical Construction and Installation Trust] to start its operations. An adit should also be extended to the arch of the underground structure of the GES and the upper section excavated.

These tasks are extremely complex and substantial. We believe that one reason for the marked lag in building the GES compared with the progress of the project as a whole is poor organization: the administration, whose seat is in Nurek, pays insufficient attention to its Rogun sector. To fulfill the standing targets and utilize the allocated funds, the Gidrospetsstroy All-Union Association should establish a separate administration in Rogun. The facilities for the fulfillment of a 13-15 million ruble program by that administration have already been created. All that it needs is to acquire additional metalworking and certain other types of equipment as well as additional skilled personnel.

In order to augment markedly the tunneling workforce, the Gidrospetsstroy is being allocated a large part of the newly built housing. Of the 256 dwellings built last year 100 were allotted to the GES sector. In the future, too, tunnelers will receive priority in housing allocations.

Extremely important tasks also face other construction sectors, primarily the construction of housing and social, cultural and communal facilities in Rogun. To assure further growth of the collective and prepare for a sharp expansion of operations next year, we need to release at least 400 more dwellings for occupancy this year. Sufficient preparations for this have been made. A kindergarten for 320 children will be completed in Rogun, and for the time being a provisional kindergarten for 120 children is being opened. Toward year end we intend to assemble a school for 1,176 children and release for use one of its buildings. It is also necessary to build a canteen, a communications building, and a TV relay station. The design of a training combine has been drafted.

Altogether, 4.5 million has been spent on building the Rogun settlement. The construction is handled by our own construction administration of the Zhilgrazhdanstroy [Housing and Civic Construction Trust] along with such sub-contractors as the Ordzhonikidzeabad Construction and Installation Administration of the Promgrazhdanstroy [Industrial Housing Construction Trust] and specialized organizations of the Santekhmontazh [Trust for the Installation of Plumbing Fixtures and Utilities] and Gidroelektromontazh, whose sectors operate in Rogun.

The task of these organizations is to assure the activation of the facilities mentioned above and not only to utilize the allocated funds but also to overfulfill the plans for construction and installation operations. This is necessary because the settlement is new and its inhabitants need even now, on moving in, a grocery store, a pharmacy, a cinema, a sports stadium, a barbershop and a shoe store as well as premises for the sector militiaman and the people's volunteer squad. Lastly, there is a need for a square or a street on which the inhabitants could promenade in their leisure time.

Considerable assistance in building the facilities enumerated above could be provided by the industrial enterprises of our trust--the reinforced concrete components plant, the SD [expansion unknown] and the house building combine. The inhabitants of Rogun request the collectives of these enterprises to show understanding for the construction of the future town of Rogun where hydroelectric power project builders already are living.

Responsible tasks face the collectives of the Spetsgidroenergomontazh and the Gidroenergomontazh. The former has to build a compressor station with a capacity of 1,000 cu m of air per minute and the latter to expand work to build a conveyor line nearly 4 km long. Operating trials of the first segment of that line should be started already this year. The conveyor line will at the same time serve as a school for training highly skilled installers.

The construction of the dam following the blocking of the Vaksh River requires clearing the slopes of sediments and soft rocks and building access roads. The most difficult and responsible operation is that of clearing the future site of the dam's core. To this end we need roads toward the dam's crest along both banks of the river. All this work is being handled by the collective of the administration for mechanized operations under the Rogungesstroy. Together with drilling and blasting workers, it will have to clear the site of the future dam core to a depth of 150 meters this year. We will badly need a road from the upstream water area to the dam site along the left bank.

Concrete supplies may prove a bottleneck in 1984, and hence the construction sector No 1 and the hydrotechnical installers will have to speed up the pace of the construction of a large gravel-sorting facility and a concrete plant. This year construction operations should be completed and the installation of equipment commenced.

Such are the main tasks of the builders of the Rogunskaya GES for 1983. A total of 23.9 million rubles has been allocated for implementing them. Over the year we should utilize 3 million rubles per month. The experience gained and the creative mood of the collective vouchsafe that the targeted programs and tasks will be fulfilled.

#### Rogunskaya GES Construction Lag Reported

Dushanbe KOMMUNIST TADZHIKISTANA in Russian 1 Mar 83 p 1

[Interview with Ye. P. Karpov, chief Rogunskaya GES Project Engineer, by A. Pal', KOMMUNIST TADZHIKISTANA correspondent: "Rogun is Drowning in Trivia" under the rubric "On Major Construction Sites"; passages enclosed in slantlines printed in boldface in the original source]

[Text] /This year the builders of the Rogunskaya GES will have to utilize 23.9 million rubles. Compared with last year, funds for this construction project have been increased 26.5 percent. Toward year end the builders should start utilizing these funds at the rate of 3 million rubles per month so as to handle still greater volumes later. The operations schedule provides for damming the Vakhsh in 1985. Thus, the third year of the five-year plan will be exceptionally important to the further expansion of the project./

/Our correspondent asked Yevgeniy Pavlovich Karpov, chief engineer for construction of the Rogunskaya GES: "How did this year begin?"/

[Answer] It began in arrears. The plan provided for utilizing 1,405,000 rubles in January, but only 1,218,000 was utilized--a proportion somewhat worse than in January of last year. We ourselves had fulfilled the plan 126 percent, and it was the subcontractor organizations that accounted for the lag. The Gidrospetsstroy sector utilized 179,000 of its 423,000 rubles and the Tadzhikdorstroy [Tajik Road Building Trust] utilized 80,000 of its 200,000 rubles. In December the Gidrospetsstroy men laid 3,700 cu m of concrete but in January they laid only 1,300. As for the road builders, they are chronic laggards; it is like a disease with them. These two subcontractor organizations hold back the progress on the entire project. The smaller subdivisions cannot, of course, make up for such underfulfillment of the plan as a whole by the main subcontractors.

[Question] But underfulfillment of the plan by some organizations apparently upsets the schedules of others, does it not?

[Answer] Of course. This especially concerns the Gidrospetsstroy. Consider just one example. It is up to that organization to prepare the front of operations for the Gidromontazh, which is scheduled to start installing the flood gate chambers during September and October. It is the Gidrospetsstroy personnel that should set the rhythm of operations for the entire project.

[Question] Yevgeniy Pavlovich, what do you think are the reasons for the underfulfillment of plans?

[Answer] There is no unambiguous answer to this. Let me point first of all to an objective reason--the winter conditions--before I focus on causes of another kind. The clearing of snow drifts, the struggle against glaze ice, the need to heat concrete mixes divert personnel and equipment from the basic operations, some of which cannot be performed at minus-zero temperatures.

The flow of supplies of construction materials and components is constantly interrupted. Drivers of panel trucks, cement trucks, and trailer trucks refuse to drive to Rogun in winter owing to glaze ice and snowdrifts, though to be sure sometimes unjustifiably. The road-maintenance crews should definitely pay more attention to the state of the resurfaced road segments, and not only in winter at that. But it is worth noting that this year January was a normal winter month rather than a particularly severe month.

Now I will discuss causes of a subjective nature, which should not exist at all or should have been much less weighty. Considerable problems arose in transporting builders to work sites. Since 80 percent of the bus fleet should be in good condition at any time, there should be enough buses available. But the

Rogun affiliate of the Motor Transport Administration [ATPO] cannot maintain such a coefficient. More public transit for the inhabitants of the town of Rogun is needed as well. We for example have to drive schoolchildren from Rogun to Obigarm. Currently we badly need three buses and two KamAZ trucks equipped for conveying passengers. There is simply no other way out.

There have been stoppages of small-capacity excavators, which means that it was not possible to prepare in time a front of operations for the Santehrabot [Plumbing Fixtures and Utilities] Construction Administration as well as for the brigades erecting bulkheads. The excavators have long since become worn and require frequent repair as they break down for all sorts of reasons. Another cause is the lack of spindle oil. The Production-Technological Supply Administration (UPTK) of the Tadzhikgidroenergostroy Trust allocated funds only in February, as if January had not existed.

Another obstacle on the road toward plan fulfillment is the unsatisfactory material-technical supply of the project.

[Question] Of the causes you listed, which one is most important at present?

[Answer] The supply problem. Consider what we received in January: nothing came of the scheduled supplies of 35.2 tons of rolled metal stock, 1,089 sq m of timbering, 35.5 cu m of special pillars, and 3,600 sq m of Rabbit screens. Of the scheduled supplies of 127.3 tons of reinforcement steel only 7.1 tons were received; of the scheduled 1,938 tons of cement, 620.4 tons; of the scheduled 89 cu m of lumber, 18.7, and so on all the way down the list.

[Question] Please describe concrete instances of how this affects construction progress.

[Answer] Consider the Gidrospetsstroy. Owing to the lack of reinforcement, it was not possible to lay concrete in the third transport tunnel. Excavation had to be suspended in the first and second construction tunnels and the first access tunnel owing to the lack of lumber for covering the temporary concrete facade.

The lack of timbering props delays the pace of the operations of construction sector No 1 and the Zhilgrazhdanstroy construction trust. The operations of the mining safety sector are about to be suspended owing to shortages of Rabbit screens and timbering props. I listed only the most urgent construction sectors.

[Question] On one sector I saw electricians wrap... rags around cable connections. What has caused such a serious violation of safety rules?

[Answer] This is one of the so-called "trivia," such as insulating tape. The entire Tadzhikgidroenergostroy Trust was allocated for this year the incredibly low amount of 100 kg of that tape. We received 15 kg whereas we need 400. Either we suspend work owing to such violations of safety rules or regard them as trivia. We lack 80-120 mm nails, ultramarine wall paints, and floor paints. Our finishing workers have long since forgotten the last time they used natural-hair brushes. In material-technical supply there is no such thing as trivia.

[Question] Has the situation changed in the last few days?

[Answer] Hardly. In Rogun we have been erecting the kindergarten building for a year now. Given the town's growing population, this building should be completed

as soon as possible. But so far we still have not received the needed prefabricated reinforced concrete components indispensable to completing the construction.

[Question] What are you builders doing about it yourselves?

[Answer] Taught by bitter experience, we stockpile materials in excess of the norms whenever possible, spending liquid capital for this purpose. We have to violate the rules as there is no other way out for us in view of the poor performance of the trust's UPTK.

[Question] You said: "Taught by bitter experience."

[Answer] This was not the first January of its kind. There has arisen the evil practice of allotting funds in January and February, whereas this should be done in October and November so that by December we would already establish firm contact with our suppliers.

[Question] In your opinion, how should the supply discipline be tightened?

[Answer] The trust's UPTK should convert to direct long-term economic relations and guaranteed supplying of construction sites. It should handle its inventories more operatively and link its plans for the supply of construction materials closely to delivery schedules. And of course, transport workers and road workers should be made accountable for interruptions of shipments. Every supplier must bear responsibility for the fate of the plan targets and obligations of the construction projects to which it supplies building materials and components. I am convinced that only such measures can tighten the supply discipline.

One more detail: The funds are allotted for practically all materials, including nails, screw nuts, gloves, soap, etc., etc. This means that suppliers should proceed only through a centralized procedure, via the UPTK, and that all these materials should be distributed among users from top to bottom. In my opinion, this is an excessive centralization, since it literally ties the hands and feet of any initiative displayed by lower-level supply apparatus. This whole procedure is simply too rigid, considering that an equitable distribution of every item down to and including wiping rags cannot be accomplished by even the most perfect supply apparatus.

/From the Editors: As can be seen from the facts cited above, the material-technical supply of the construction of the Rogunskaya GES and the workers' settlement of Rogun is in a critical situation. The editors of this newspaper expect from the Tadzhikgidroenergostroy Trust and the Tajik SSR Gosplan a reply to the questions posed./

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CSO: 1822/229



ERRATUM: This article republished from  
JPRS 83708 of 17 June 1983 No 152 of  
this series pp 37-47 to make certain  
translation changes.

## GENERAL

### DEVELOPMENT OF WESTERN SIBERIAN OIL AND GAS INFRASTRUCTURE

Moscow MATERIAL 'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No.2, 1983 pp 6-15

[Article by V. Kuramin, chairman of the Interdepartmental Commission for Development of the Western Siberian Oil and Gas Complex, section chief of the USSR Gosplan]

[Text] The Western Siberian Oil and Gas Complex today--the leading region of oil and gas extraction--produces more than half of all the oil and gas extracted in our country. Still more considerable are the prospects of its development envisaged by decisions of the 26th CPSU Congress. In the 11th Five-Year Plan in Western Siberia the daily output reaches a million tons of oil and a billion cubic meters of gas. That task can be solved only upon the condition of constant increase of production capacities, improvement of technological processes and systems of control and comprehensive saving of manpower and material and financial resources.

The development of the Western Siberian oil and gas complex involves large capital investments. In 1982 they exceeded 8 billion rubles, including expenditures on materials and equipment of 5.6 billion rubles. It is not difficult to calculate that each percent of saving means a saving to the state of 56 million rubles. That is why the slogan proposed by the party--economics must be economical--acquires special importance. The Interdepartmental Commission on the Development of the Western Siberian Oil and Gas Complex devotes constant attention to questions in determining the optimum requirements for materials and equipment, the timely and high-quality delivery of resources, their rational use and careful preservation. This is the most important direction of our work.

On all these problems we introduce our proposals in the corresponding ministries, the USSR Gosplan and the USSR Council of Ministers. Thus, in accordance with our recommendations the board of the USSR Gosplan approved "Methodical indications on the procedure in planning the development of the Western Siberian oil and gas complex." Now the development of indicators of the draft of a plan on the complex is accomplished simultaneously with the preparation of a draft of a plan on the whole by branches. Corresponding USSR Gosplan sections are entrusted with the preparation of norms of consumption for determining

the requirements of material and technical resources assigned to USSR ministries and departments, for separate buildings of the Western Siberian complex. Individualizing the planning will permit intensifying monitoring the use of resources on buildings of the region.

Along with the development of such basic problems, the Interdepartmental Commission also concerns itself with questions connected with increasing the effectiveness of expenditure of raw material, materials, structures and equipment directly on industrial enterprises and buildings.

For example, analysis of the work of gas-processing plants of the "Sibneftegaz-pererabotka" Production Combine of the Ministry of the Petroleum Industry showed that it is possible to organize propane production at the Yuzhno-Balyk gas-processing plant and provide it for the needs of Tyumen' Oblast. The Interdepartmental Commission introduced such a proposal. It was carried out. Previously tens of thousands of tons of the valuable chemical had been shipped into Tyumen' from Moskovskaya and Ryazan' Oblast and Tatarsiya. Propane production on site permitted reducing the need for railroad tank-cars by 150 units and reducing transport expenditures by almost 100,000 rubles.

The question of using large-diameter pipes and their drawing them into national economic circulation was examined. The commission proposed prohibiting the Ministry of Construction of Petroleum and Gas Industry Enterprises from using pipes which have arrived in the past year, the drawing into circulation of pipes of the old supplement, the construction of all sections of reserve lines of gas pipelines, as abandoned pipes corrode and become unsuitable due to mechanical damage during the construction of new objects of the same passages of routes.

The Interdepartmental Commission introduced into the USSR Gosplan specific proposals on the organization of centralized repair of equipment working in Western Siberia by the ministry-manufacturers in order to supply their spare parts through the USSR Gosplan system. A preliminary economic estimate confirms the high economic effectiveness of introducing in Western Siberia centralized repair of units, machines and mechanisms at enterprises of the machine-building ministries. Expenditures on the operation in Western Siberia of equipment issued by the USSR Ministry of the Automotive Industry, the Ministry of Agricultural Machine Building and the Ministry of Construction, Road and Municipal Machine Building and the Ministry of Heavy and Transport Machine Building will be reduced in 1983-1985 by 710 million rubles. The USSR Gosplan approved these proposals.

The Interdepartmental Commission also successfully solved a number of other important problems connected with increasing the effectiveness of use of resources in the region and coordinating with branch and territorial planning. This proves the effectiveness of creating such coordination centers in places of concentrated construction.

At the same time, we understand that while we work far, if it can be thus expressed, from full capacity.

At the November 1982 Plenum of the CPSU Central Committee the secretary general of the CPSU Central Committee, comrade Yu. V. Andropov, emphasized: "Plans as before are carried out at the price of large expenditures and production outlays." Unfortunately this also applies to the work of the Western Siberia Oil and Gas Complex. A number of serious problems arose. Their very rapid solution will help to greatly increase the yield of capital investments and reduce material and labor expenditures.

One such problem is the correct determination of the requirements for materials and equipment. In construction the main planning document for that purpose must be the estimated design plans and specifications, developed with consideration of the achievements of scientific and technological progress. The date for presentation of such documentation is 1 July. At the same time, requests for materials and equipment are made up before that date, and for special equipment much earlier--in the fourth quarter of the previous year. This has the result that the requirement for construction materials is calculated according to the specific expenditure per million rubles of construction and installation work formed in the previous year for which the actual over-expenditure of some materials and under-expenditure of others occur. Great difficulties arise as a result.

The matter is still more complex as regards determination of the requirement for equipment if by the start of the order period the planning documentation has not arrived. As a rule this leads to disruption of the periods for making up complete sets of equipment, especially the complex equipment.

Often the plans do not include a complete characterization of a given piece of equipment. In the stage of planning the institutes do not coordinate the questionnaires and working drawings with manufacturing plants for the manufacture of special equipment requiring individual execution, for example, such as high-voltage cells, panels of monitoring and measuring instruments and automation, and substations of all types. This leads to disruption of equipment manufacturing schedules and in the long run to disruption of production schedules for the completed assemblies and for the construction of objects.

Let me refer to a specific fact. The Giprotymenneftegaz and Giprovostokneft' institutes and others in the planning of pumping stations envisage the use of oil pumps with a horizontal inlet, but the plants manufacture them with vertical ones. In the stage of planning this question is not coordinated. As a result the making of complete sets of unit equipment issued by plants of the "Sibkomplektmontazh" Association is delayed. Thus, in the plan of the unit pumping station, for the final separating equipment of the Fedorovskoye deposit of the "Surgutneftegaz" Association, NK 560/335-70GI pumps were envisaged. That equipment of the enterprise could not be made. Glavtyumenneftegaz has to search for a replacement. Time passed, and the pumping system arrived at the construction site two months late.

It is quite evident that, if the estimated design plans and specifications are on hand, it is possible to avoid all these complications, establish a technically substantiated expenditure of materials on an object, shorten the periods for compilation and improve the quality of the ordering documents, and shorten the construction period of objects.

Let us assume that the design documentation has been prepared, is of high quality and has arrived on time. Will it be free of all defects? No, of course not. Because the materials and equipment envisaged by the plans must still be obtained completely. And that does not occur in practice. Interfering above all are the multicomponent character and multichanneling of material and equipment supply.

At the present time in the region of the Western Siberian oil and gas complex, side by side with the statewide system of the USSR Gossnab and the USSR Goskomnefteprodukt there operates a very ramified departmental system of material and equipment supply. Under those conditions an effective operative manoeuvring of the material and equipment resources is made very difficult, and at times simply impossible.

Each department strives to have on its bases a whole list of material resources necessary for production, independently of the dates of consumption, and creates its own warehouses. This diverts resources, requires people for the reception, storage and issuance of material values. Thus, on the balance sheet of enterprises of the Western Siberian oil and gas complex there are twice the capacities of the oil base of the RSFSR Goskomnefteprodukt, although the freight traffic of the latter and the departmental warehouses of fuel and lubricants is identical.

The Interdepartment Commission is striving toward centralization of the supply of fuels and lubricants and to transfer department warehouses to the jurisdiction of the RSFSR Goskomnefteprodukt Administration. This will permit more efficient maneuvering of resources by increasing the monitoring of fuel consumption and curtailing losses.

In line with the USSR Gosplan, centralization of supply can also give a great benefit. Today the freight traffic of its subdivisions in the region of the complex is unallowably small--about one percent. In the regions of oil and gas extraction there are no enterprises for Gossnab deliveries to this day. The plan for development of a union-wide system of material and equipment supply in 1981-1985 and for the long term to 1990 envisages the construction of new and the reconstruction of existing enterprises of the Tyumen's Main Territorial Administration in eight zones of servicing. However, their production capacity will permit handling only four percent of the total freight traffic of material and equipment resources of the oil and gas complex.

The construction of these enterprises is being carried out very slowly. In the city of Surgut there have already been 3 years of construction of the first stage of a USSR Gossnab base with an estimated cost of 8.6 million rubles. The "Surgutelektroset'stroy" Trust of the USSR Ministry of Power and Electrification has expended less than one-fifth of those resources. In the past year no work at all was done on that object.

As early as 1977 a decision was adopted on the construction of a warehouse complex at Novyy Urengoy. However, it is planned to start that construction only in the present year.

It is thought that the USSR Gosplan, jointly with interested ministries, should review the plan for development of a state-wide system of material and equipment supply in the region of the Western Siberian complex, determine the capacity of the planned warehouse complexes and accelerate their introduction into use. The creation of a ramified network of enterprises of the USSR Gosplan in that region will permit centralizing the providing of material and equipment resources, increasing the operativeness of maneuvering them, intensifying monitoring the correctness of use and the degree of complex supplying of enterprises. In proportion to the construction of warehouse complexes by the USSR Gosplan conditions will be created for the transfer of departmental bases into the subordination of its territorial organs.

Timely and qualitative material and equipment supply is an invariable condition of any production. For the Western Siberian Oil and Gas Complex observance of that condition is still more important. Material and equipment must be brought in there to the place of consumption either in limited periods of navigation, especially into regions of the Extreme North, and to points on small rivers or a railroad where the volumes of shipments to each consumer are strictly limited. A considerable part of the resources are transported by the railroad service of the builders themselves--a department of temporary operation. The conditions are extreme, it must be said directly. Anything lost today is never recovered.

Many manufacturing enterprises, knowing the conditions of freight deliveries, deliver material resources on time and in full volume. They include the Vol'sk cement plant, the Kurgan bus plant and the Miass automobile factory, the Chelyabinsk tractor plant imeni Kolyushchenko, the Novomoskovskiy imeni 50th Anniversary of the Soviet Union and the Severskiy imeni Merkulov pipe plants, the Bilimbay thermal insulating materials plant and many others. Siberian oil workers, geologists, gas workers and construction workers express sincere gratitude to them.

But there are still many enterprises which violate delivery dates and make incomplete shipments: the Magnitogorsk, Chernorech'ye and Totki cement plants, the Chelyabinsk and Western Siberia metallurgical combines and the Southern pipe plant imeni 50th Anniversary of the Great October Socialist Revolution. The Tyumen's Main Territorial Administration must display greater activity, establish strict control of the unconditional delivery of material and equipment resources to the Western Siberian Oil and Gas Complex.

In recent years the USSR Gosplan, jointly with the ministries engaged in developing oil and gas deposits of Western Siberia, designates a list of the most important construction sites of the current year and determines their material and equipment requirements. This is a good thing, but it is not done thoroughly enough. What is the result in practice? Let's assume that a given glavk has a total supply of rolled metal of 36,000 tons, including 20,000 tons for the most important construction sites. If the 20,000 tons are delivered, it is assumed that the most important construction has been assured. But the fact that the wrong material, with wrong specifications was delivered is not taken into account. Thus, a situation develops where good intentions do not give the expected result. The supplier appears

to have a "loophole" to under-deliver materials if a construction site has not fallen into the category of the most important. In essence, under-deliveries are legitimized. In our view, the responsibility of the parties for actual disruption in the supplying of construction sites with necessary resources should be clearly determined legally.

Many difficulties are encountered by those who obtain local construction materials--brick, wallboard, crushed rock and lime on inter-regional deliveries. Oblast shippers strive above all to supply their own consumers and only then other regions. Such a situation constantly forms with deliveries from Sverdlovsk, Omsk and Kemerovo oblasts. The solution of these questions is the responsibility of RSFSR Gossnab. The successful work of enterprises of the Western Siberian complex depends on its efficient monitoring of the deliveries of local construction materials.

A considerable quantity of material and equipment resources is required in the region. Thus, in Tyumen' Oblast 3.3 million tons of fuel and lubricants were expended in 1981. By 1985 their requirements will reach 4.6 million tons, and 6.3 million tons by 1990. Under such conditions it is extremely important to search for the possibility of using local resources. However, the method of providing them remains basically the same one--shipment from other regions.

True, in the region experience has been accumulated in the partial satisfaction of the requirements for motor fuel by processing gas condensate from the Urengoy deposit. Since 1979 a pilot plant has been in operation here which produces about 50,000 tons of diesel fuel per year. A decision has been made to construct at Urengoy four similar plants with a total production of 200,000 tons per year.

However, the "Tyumen'gazprom" Association of the Ministry of Gas Industry is very slowly implementing that program. They have not yet started the construction of plants; their start-up in the present year is not even planned. Taking into account the sharp increase of the fuel and lubricant requirements in regions of gas extraction, it is hardly possible to justify such an attitude of the Ministry of Gas Industry toward the construction of those installations.

In the presence of an enormous scope of construction the requirement for thermal insulating materials is increasing annually. Their application permits saving thermal energy. Mineral wool and fiberboard are shipped into oil extraction areas from outside and the means to transport them are diverted. Into Tyumen' Oblast alone 384,000 cubic meters of mineral wool are shipped annually. Five thousand freight cars are needed for their shipment.

However, the organization of the production of such a quantity of mineral wool directly at the places of consumption from imported starting raw material with the use of local type of fuel, e.g., casing-head gas, would require a tenth as much rolling railroad stock. In addition, Tyumen' Oblast has available enormous reserves of diatomites. From them one can obtain liquid glass--the starting product for the production of many materials, including thermal

insulating materials. Thus, foam glass granulite has many advantages over traditional thermal insulating materials. It is light, has high strength and low moisture absorption, is frost resistant, fire resistant and biostable.

Into the region of the Western Siberian Oil and Gas Complex are shipped 1.6 million tons of structural cement (with consideration of 150-300 day transitional stocks as a function of the region of consumption). It is known that even under normal conditions of storage the binding properties of cement diminish with time. If the starting raw material--clinker--is shipped to the place of consumption and its grinding is organized as needed, the construction sites will be provided with high-quality cement. In that case the expenditures on construction of costly warehouses will be reduced and considerable quantities of transport will be released.

It should be noted that brick production capacities are slowly increasing in Tyumen' Oblast. Moreover, existing capacities are not brought into designed conditions for a long time. Thus, two lines of the Tobol'sk ceramic construction materials plant are capable of producing 45 million bricks a year. Nevertheless, in 1982 one-fourth as many were produced. The RSFSR Ministry of Industrial Construction Materials together with the consumer ministries must think about and work on this.

The question of production of a number of materials at the place of consumption is extremely urgent. Its solution will permit saving a large quantity of resources and releasing transport, and assuring rhythmic supplying of the developing oil and gas complex.

The effectiveness of material and equipment supplying of production is everywhere and always connected with reliability of the transport arteries. That interconnection is especially important for the Western Siberian Oil and Gas Complex. Here it even is difficult to determine what is more complex, to obtain the funds for material resources and make agreements with a supplier on the time of shipment of resources, or to solve the question of allocating transport resources for their shipment.

Of course, it is economically more advantageous to deliver materials and equipment from a supplier directly to the destination point by rail. This eliminates additional freight handling, in the course of which freight often is damaged, and shortens the times required for deliveries. However, shipments over a single-track railroad, especially those being built, are strictly limited. Therefore the entire traffic flow cannot go (and must not go in the navigation period) only by railroad.

The volume of shipments is limited not only by the transport capacities of the steel arteries, but with weak development of access railroad lines and by the absence of hoisting and transport means at the consignee's. Therefore the freight cars often accumulate to await being unloaded. Such a situation is created, as a rule, through the fault of individual consumers.

Cars often accumulate at house-builders of the oblast. Railroad men know this but announce conventional bans for all consignees: Oil workers, gas

workers, etc. As a result they unload some freight cars accumulated through their fault, and most consumers stand and do not complete construction sites with materials and equipment.

The results of such apathy of railroad workers are unfortunate. The restriction period is ending and intensive shipment of cars to shippers is starting. This creates the prerequisites for a new convention. Railroad men need to more wisely use their right to forbid the loading of cars, to apply it only to consignees through whose fault the accumulation of freight cars occurs.

Many railroad authorities, from managers of the Ministry of Railways to station-masters, have the right to limit in an operative procedure the feeding of freight cars in general and of specialized cars in particular. Here in recent years it also has occurred that there is a plan for freight cars but no confidence in its execution. Of course, there are natural calamities. Then it is necessary to ship freight into separate regions of the country on time or, on the contrary, to ship them out. But perhaps the sowing, harvesting, winter and heating seasons are in some way calamities not provided for? Of course not. Of course it is necessary to plan shipments for those needs first and to establish for the remaining freight shippers a diminished but firm plan for supplying freight cars, clearly determining their quantity and the type of rolling stock.

There are many problems in river transport. The largest of them is freight shipments on small rivers. In connection with organizing oil and gas deposits at great distances from main water routes, the need to transport freight on small rivers grows from year to year. Moreover, the navigation period on those rivers is not more than 2-3 months (and on some 1-1.5 months), navigable conditions are limited there and of course the carrying capacity of the fleet. Therefore deliveries of vessels for those purposes must be greatly increased. And not simply of vessels, but of small-tonnage vessels, with freight capacities of 300-1000 tons. Actually, the Irtysh and Western Siberia steamship companies are supplemented by large-tonnage vessels which cannot operate on small rivers. We think that it is necessary for all small-tonnage vessels produced by enterprises of the steamship companies of Western Siberia to be transferred over to them. The Tyumen' Shipbuilding yard should be partially reoriented to the construction of vessels capable of operating on small rivers. Without a timely solution of this problem the organization of new oil and gas deposits will be delayed.

River men are not doing everything to increase freight shipments for enterprises of the Western Siberia Oil and Gas Complex. In recent years there have not been large enough quantities of freight to open navigation at the river ports. At the same time, at departmental bases traditional freight for mixed railroad and water transport, rolled metal, pipes, cement and bricks are accumulating. Taking into account the limited navigation periods, at river ports it is necessary during the entire winter to accumulate first products intended for shipment on small rivers. This applies especially to the Surgut, Nizhnevartovskiy and Tobol'sk river ports.



The Surgut river port is on the crossroads of freight traffic into oil-extracting regions. It is equipped with high-capacity transshipment mechanisms. However, the longshoremen have established themselves a limit on unloading 22 freight cars per day, although the capacities permit processing 80 freight cars or more. As a result the oil workers and construction workers are obliged to ship part of the materials along the Agan river from the city of Nizhevartovsk. That leads to unjustified increase of the mileage of transport means by over 400 kilometers.

The river men of the Irtysh Steamship Company draw poorly on the departmental small-tonnage fleet for freight shipments on small rivers. In our view it is advisable to include as well the steamship companies in the plan for the transshipment of a limited quantity of direct, mixed railroad-water communications cargo. At the same time the non-transport ministries should be obliged to make available to the port the required number of vessels needed for the transportation of those shipments.

It is known that on river transport the rates of development for means of transport outrun the rates of construction of port-landing facilities. This is especially noticeable in Western Siberia. Moorage construction there lags behind time requirements. One reason is the creation of numerous departmental moorage facilities. In Tyumen' Oblast 25 moorages will be constructed, and the river men have ordered only five of them. The construction of large river ports must be centralized. Without concentration of resources, a situation will continue like the one in Labytnangi and Sergino. There, together with moorages of the RSFSR Ministry of the River Fleet, five or six departmental moorages exist or are being built. Forces and resources are being scattered, and there is not a single master in the full sense of the word. In line is the Yamburg port; the RSFSR Ministry of the River Fleet must act as the construction customer. This is all the more justified because the Ministry of the Gas Industry is ready to transmit resources for construction of the port.

Workers of aviation transport are to introduce their own model in the improvement of the provision of the Western Siberian Oil and Gas Complex. Very many questions would have been solved if the Tyumen' Civil Aviation Administration had accomplished the loading and unloading of airplanes with their own manpower. The fact is that on the territory of the Roshchino airport departmental bases are multiplying like mushrooms after a rain. Each has its own quarters, people and mechanisms. As a result a large number of people constantly accumulates who await their turn in the loading and unloading of airplanes. All these fixed assets, personnel and warehousing should be concentrated in single hands. Then order will be introduced.

It is important to bring in freight in totality and in safety. The struggle for preservation of materials and equipment must be started at the manufacturing plants. It is precisely here that merchandise is packaged. And one of the purposes of containers and packaging is precisely to assure preservation of the cargo. But the manufacturers often simply make the appearance of a package. How else can one speak of packaging of mineral wool in wrapping paper. This thermal insulating material is unloaded from a freight car with a fork. It can be pictured what remains of the packaging at the very first

transfer. It is not necessary to even speak of the working conditions of the longshoremen. More than once they have asked the manufacturer to ship mineral wool in a different wrapping. However, the Omsk and Sverdlovsk mineral wool plants, as they say, give no ear to the requests of consignees. Also preserved in no better form is semi-rigid mineral tile packaged in a screen container. However, if it is packaged in large boxes, the tile will be whole and the labor productivity will increase sharply, and expenditures of materials on packaging will be reduced. But the manufacturer acts as before. Why should he take extra trouble, when the consignee is willing to take a scarce material in any form?

A radical solution of the problems in improving the preservation of shipments is connected with the further development of packaging and containerizing. Their efficiency is unquestionable. Packaging and containerizing reduce the downtime of means of transport by tens of times, assure the preservation of shipped cargo. Many shipper-plants have gone over to that progressive method. Glass-making plants ship their production in special containers. The Korkino and Chernorech'ye cement plants have begun to use heat-setting film for the shipment of cement in packages. The advantage from such shipments is evident. And Nevertheless this introduction proceeds slowly. In the past year in heat-setting film were unloaded a total of 72,000 tons out of 2.2 million tons of construction and oil-well cement. As a result its losses were large.

In a recent time the breaking up of complete sets of equipment during shipment by river and railroad transport became really severe. On the way lighting instruments, electrical equipment and instruments were removed. Their cost is not great, but without them the equipment which has arrived at destination points stands unused for months. Enterprises of the "Nizhnevartovskneftegaz" Combine of the Ministry of Gas Industry annually receive hundreds of units of equipment in broken sets. On the average the mechanisms stand from 5 to 10 days, and some for several months.

Therefore consignees of shipments often have to give up the service of railroads and transfer machines under their own power all over the country. This does great damage, drivers highly qualified as a rule are drawn off, and a large amount of fuel and lubricants is expended. When there is no other way out and it still is necessary to use railroad transport, consignees are required to send their own people to those plants to accompany the shipment. Since it includes shipments for many organizations, just as many people accompany them.

The Ministry of Railways has curtailed expenditures on militarized protection. And consignees expend far more for those purposes. Annually, thousands of people are drawn in to the work sites of the Western Siberian Oil and Gas Complex for shipment of equipment from plants; labor expenditures are more than 140,000 man-days. In practice this means that in a year hundreds of drivers are withdrawn from production. Expenses for such purposes amount to hundreds of thousands of rubles.

In August of last year the Ministry of Railways issued an order on supplementary measures to assure preservation of national economic shipments and intensify the struggle against theft on railroad transport. But no traceable improvement is evident as yet. The Ministry of Ways of Communication must intensify monitoring of the implementation of its own order.

There is no question, consignees play a decisive role in assuring preservation of material resources. At times one must encounter the facts of lack of economy and responsibility on their part: valuable equipment is dumped on the ground, wasted and complete sets are broken up. Thousands of tons of cement are converted into stone because necessary measures are not taken for its protection against atmospheric precipitations. At the Labytnangi base of Glavtyumengeologiya in the period of navigation the Interdepartmental Commission revealed serious shortcomings in pipe storage. Only after its intervention did the glavk [central directorate] take measures, the base was put in order and pipes were shipped to destination points.

All this indicates that not all ministries and departments participating in the creation of the Western Siberia complex are sufficiently responsible and seriously concerned with increasing the effectiveness of use of material and other resources, and involve the solution of questions connected with them.

Of course, eventually such problems will be solved. But it is better that this occur earlier. It is necessary for ministries and departments to display a maximum of efficiency and flexibility. This not only will accelerate the development of the country's largest oil and gas complex, but also will sharply reduce the cost of creating it, will permit increasing the yield of oil and gas economically, with a considerable saving of state resources.

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CSO: 1822/191

GENERAL

UDC: 613.6:625.78

ADOPTION OF EXPERIMENTAL WORK, REST SCHEDULE HELPS CONSTRUCTION WORKERS

Moscow GIGIYENA TRUDA I PROFESSIONAL'NYYE ZABOLEVANIYA in Russian No 11,  
(manuscript received 14 Apr 82) Nov 82 pp 12-16

[Article by Yu. M. Bagdinov, All-Union Institute for Construction of Trunk  
Pipelines, Moscow]

[Text] The passage of trunk pipeline right-of-ways across areas with complex climatogeographic conditions (large number of rivers, existence of swampy and mountainous stretches, harsh temperature conditions in the northern regions of this country, etc) greatly complicates pipeline construction and reduces available construction time within a calendar year. In Western Siberia, for example, for all practical purposes the pipeline construction season runs from November through April. This requires a maximum possible increase in the pace of construction activities during that time of the year which is favorable for construction. It is this which dictates the introduction in construction organizations of a work schedule with an integrated work time count. Such organization of labor specifies the adoption of work periods with increased length of work day and work week for a specified length of time, with subsequent compensation for extra time worked in the form of time off or a reduced workday within a given work period.

Of particular importance in these conditions are matters pertaining to making work and rest schedules more efficient, achievement of which should foster increased labor productivity and diminished worker fatigue under the effect of work stress loads.

Analysis of data in the literature (V. V. Kolpakov, P. P. Solodukhin, Yu. M. Bagdinov et al, etc) indicates the possibility of various reactions of systems and functions of the human organism with a work schedule involving an integrated work time count.

At the same time the special conditions of pipeline construction (continuous advance of the spread, complexity of organization of living conditions in the field, frequently in sparsely populated area) dictate the specific peculiarities of matters of work and rest schedule, methods and means of maintaining functional activity and preventing extreme worker fatigue. These specific features consist in the need to provide a combined solution to problems of organizing work and rest, worker off-duty routine and diet, in combination with preventive medical measures and monitoring of the afterwork rest schedule.

On the basis of the results of comparative studies of existing work and rest schedules for welding crews (Yu. M. Bagdinov et al), we devised an experimental schedule, prepared and confirmed a program for adopting it.

Experimental adoption of the proposed work and rest schedule (Figure 1) was accomplished in a welding crew on an oil trunk pipeline right-of-way in the northern part of Western Siberia, and during the period of schedule testing and approval we organized the daily activities, feeding, and rest for the welding crew on the right-of-way, directly within the work spread zone (within a distance of 10 minutes driving time). In-shift work time duration was 10 hours, with simultaneous organization of labor, with the shift beginning at 0800.

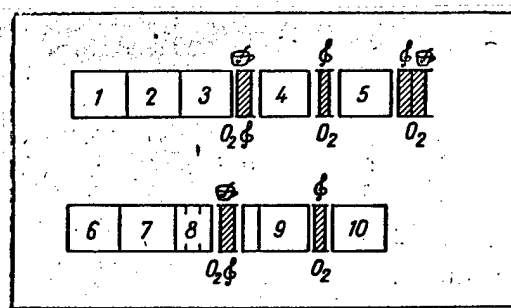


Figure 1. Pipeline Construction Worker Work and Rest Schedule.

The Arabic numerals indicate working hours; the shading indicates work breaks; O<sub>2</sub> -- measured administration of oxygen; treble clef -- music and literary broadcasts.

During the shifts we tested a schedule with five rest and meal breaks (the first -- 15 minutes, second -- 10 minutes, third -- 30 minutes, fourth -- 15 minutes, fifth -- 10 minutes). In order to relieve fatigue and accelerate restoring work efficiency during the breaks, we played broadcasts of music, humorous stories, and applied measured doses of pure, moisture-added oxygen. We additionally scheduled five meals a day for the workers (breakfast, brunch, lunch, dinner, supper), with mandatory monitoring of menu and caloric content of meals. After completing a shift, workers would bathe, take oxygen, and we tested the possibility of performing self-massage and mutual massage, employing portable home massagers. Worker rest was also monitored.

Measures conducted after work were for the purpose of maximally increasing after-work rest time by bringing living quarters closer to the work area, by establishing mobile crew living quarters. The aggregate of preventive-medical procedures (bath, oxygen, massage), a rational diet and music broadcasts were to help speed up recovery from fatigue and help the workers rapidly switch psychologically to a rest regimen.

During the process of the experiment we conducted dynamic observations of the condition of the principal systems of the arc welders' organism throughout the course of the work day and work week, and we compared them with corresponding indicators for the arc welders of that same group prior to initiation of the experimental regimen, as well as with indicators obtained from arc welders in this country's central zone working a normal workday.

Study of the state of the cardiovascular system according to pulse rate during work indicates that adoption of the experimental schedule helps stabilize functioning of the cardiovascular system. The pulse rate of arc welders in this group varies over the course of the work day and week across the same range as that of arc welders in the central zone, and is below 100. This enables us to state that the functional loads on the cardiovascular system of the arc welders in the crew under observation correspond to the loads noted during performance of jobs of average physical difficulty. Before introduction of the experimental schedule, the pulse rate of the workers in this group reached 110 by the end of the workday at the beginning of the week, and 115 by the end of the week, that is, the nature of changes in the cardiovascular system corresponded to deviations noted during heavy physical labor.

Investigation of the functional state of the central nervous system on the basis of change in rate of reaction to stimuli in the dynamics of a work shift indicates that the degree of retardation of reaction in the workers of the brigade under observation by the end of a work shift amounted to 15 percent in respect to the initial level at the beginning of the week, increasing to 17.8 percent by the end of the week. Prior to introduction of the experimental schedule, slowing of the reaction rate was of a more substantial nature (by 16.7 percent on the first day of the week, by 17.8 percent on the fourth, by 21.2 percent on the fifth, and by 24.0 percent on Saturday), that is, the appearance of elements of cumulative fatigue was noted by the end of the week.

Investigation of the nature and magnitude of changes in how long arms can resist a static force also indicates a substantial decrease in the degree of worker fatigue as a result of adoption of the experimental schedule. Prior to adoption of an efficient work and rest schedule we noted a decline in level of endurance which is characteristic of heavy physical work (by the end of the shift endurance had declined by 24.5 percent, and to 33.8 percent by the end of the week), while after introducing a more efficient work and rest schedule changes in endurance in the dynamics of a work shift and work week decreased to the level of physiological fluctuations noted in performing work of average physical difficulty (an endurance decline of 14.9 and 18.2 percent respectively).

An investigation of thresholds of vision indicates that their change, attesting to level of fatigue of the visual analyzer, in the course of a workday and work week is of a uniform nature in the arc welders of the observed brigade with the functional fluctuations noted in arc welders in the central zone. There was noted in workers of the central zone an increase in visual thresholds of 20.2 percent in the dynamics of the first day of the week, and an increase of 28.9 percent on the last day of the week, while in arc welders of the brigade in which the proposed work and rest schedule was tested, the figures were 21.7 and 31.9 percent respectively (the difference is not statistically significant).

We should note that prior to adoption of a rational work and rest schedule, appearance of indications of fatigue in the visual analyzer in arc welders working in the northern part of Western Siberia was of a more substantial nature by the end of the work shift and particularly the end of the work week (rise in visual thresholds was 33.7 percent by the end of the first day of work, and 50.7 percent by the end of the sixth, that is, on Saturday).

Analysis of the dynamics of the indices of all investigated systems indicates that by the end of the week there is noted in all observed groups a change in initial indicators at the beginning of the work shift. This indicates the appearance of signs of cumulative fatigue by the end of the week in the principal systems of the workers' organism. At the same time, however, in conditions of the experimental schedule, signs of cumulative fatigue did not appear until the last day of the week.

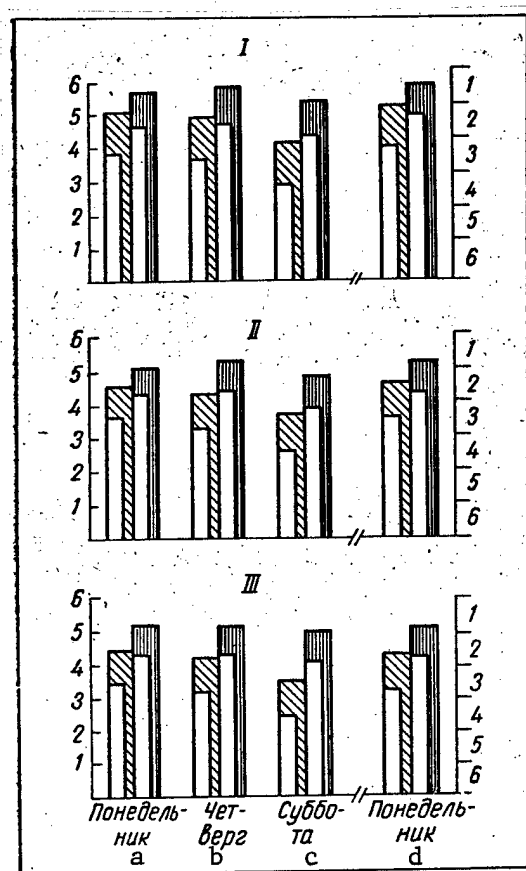


Figure 2. Change in Indicators of Subjective Physical Well-Being, Activeness and Mood in Arc Welders in the Course of the Workday and Work Week.

On the Y axis -- SAN psychological test score points; on the X axis -- days of the work week; columns with oblique hatching -- SAN test indicators at the beginning of the workday, before introducing the experimental work and rest schedule; columns with vertical hatching -- following adoption of new schedule; columns without hatching -- SAN test indicators at end of workday; I -- subjective physical well-being: 1 -- good; 2 -- satisfactory; 3 -- average; 4 -- below average; 5 -- poor; 6 -- very poor; II -- activeness; 1 -- high; 2 -- elevated; 3 -- average; 4 -- reduced; 5 -- low; 6 -- very low; III -- mood: 1 -- good; 2 -- satisfactory; 3 -- average; 4 -- fair; 5 -- poor; 6 -- very poor.

a -- Monday; b -- Thursday; c -- Saturday; d -- Monday

Full recovery of the functional properties of all systems of the organism in the arc welders of the observed brigade following a day of rest is indicated by the initial levels and dynamics of the indicators of all investigated systems on the following Monday, which do not differ from those on the preceding Monday. Prior to adoption of the experimental schedule, full recovery of functioning of systems following a day of rest was not observed in this same group of workers. The obtained data indicate that with organization of jobs with integrated work time count, a rest day at the end of each week should be mandatory.

We also employed the SAN psychological test (V. A. Doskin et al) to investigate the functional condition of workers. The obtained data (Figure 2) and the performed evaluation of the significance of differences in indicators between groups according to the Wilcoxon-Mann-Whitney criterion indicate with a high degree of reliability a substantial improvement in subjective physical well-being, activeness, and mood both in the course of the workday and in the course of the work week on the part of workers following adoption of the experimental work and rest schedule.

Observation time-study data and evaluation of brigade output indicated a 15 percent increase in shift and week labor productivity.

The materials of the study, after a number of additions had been made, were used in drawing up the "Provisional Regulations on Work and Rest Schedule for Trunk Pipeline Construction Workers," which were prepared in agreement with the Health Protection Administration of the RSFSR Ministry of Health attached to the Ministry of Construction of Petroleum and Gas Industry Enterprises, with the Central Committee of the Trade Union of Oil and Gas Industry Workers, and was approved by the Ministry of Construction of Petroleum and Gas Industry Enterprises.

**Conclusion.** Organization and conditions of construction of trunk pipelines require comprehensive solution of problems pertaining to schedule and conditions of work and rest, off-duty activities and meals, as well as the performance of preventive medical procedures for the purpose of preventing excessive fatigue of the workers' organism.

Adoption of the experimental work and rest schedule helps increase labor productivity and improve functioning of the principal systems of the organism and the workers' psychological mood.

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3024

CSO: 1822/282

GENERAL

UDC 616.1-008-057:616-008.28:622.24

EFFECTS OF OFFSHORE DRILL RIG NOISE ON CARDIOVASCULAR SYSTEM MEASURED

Baku AZERBAYDZHANSKIY MEDITSINSKIY ZHURNAL in Russian No 11, Nov 82 pp 59-63

[Article by A. V. Igrevskiy: "The Effect of the Noise of the Floating Drill Rig 'Baky' on the Functional State of the Cardiovascular System of Members of the Crew"]

[Text] From the Noise and Vibration Laboratory (the manager is I. I. Varenikov) of the Scientific-Research Institute for Water-Transport Hygiene of the USSR Ministry of Public Health.

Offshore drilling, including the drilling and operation of oil and gas wells, is greatly different from drilling on land. Two groups of facilities are singled out herefrom which offshore drilling is being conducted: fixed and floating drilling installations (S. I. Akayev, 1957). The floating drilling facilities include mobile machinery and facilities for structural prospecting and deep exploratory drilling: floating jack-up drill rigs (SPBU's), submerged and semisubmerged floating drill rigs (PPBU's) and drilling ships (A. M. Dzhaferov, 1981).

Hygiene research at drill rigs that was conducted on land and at fixed offshore facilities showed that noise is one of the leading unfavorable factors that accompany the operating process. According to the data available in the literature, noise can affect the cardiovascular system (N. N. Shatalov, 1976; and S. S. Markaryan and co-authors, 1980). Unfavorable job factors influence the cardiovascular system secondarily, as a rule. There are no specific changes of the cardiovascular system that exist upon exposure to noise (Pžerovska, 1976).

Research aimed at finding changes in the cardiovascular system caused by exposure to noise on PBU's (floating drill rigs) was not found in the literature accessible to us. Because of this, we studied the dynamics of the functional state of the cardiovascular systems of workers of the SPBU "Baky."

In all, a study was made of 18 crew members of the SPBU "Baky" (10 substructure-portal drilling workers, 4 pump mechanics and 4 MKO [machinery and boiler department] diesel-motor operators); all of them were subjected to investigation twice: before going on a 12-hour shift (the first day of the rotation period), and 7 days later (at the end of the rotation)--also before going on shift.

It can be noted, in comparing the hygiene noise characteristics of the workplaces of the workers of the vocational groups being studied--substructure portal workers: 82-85 dBA (not in excess of the GOST [State All-Union Standard] 12.1.003.76; pumpworkers: 94-96 dBA (an excess of 9-11 dBA; and machinery and boiler department (MKO) workers: 106-111 dBA (an excess of 21-26 dBA)--that the vocational groups of the PBU workers being studied were working at places sharply different in noise characteristics: they were most unfavorable for the MKO workers, and then for the pump workers, and then the portal workers.

The heart-beat rate (ChSS), the arterial systolic (AD sist.) and diastolic (AD diast.) pressures were determined, in order to study the functional state of the cardiovascular system. In using these indicators, the following were computed: Kerdo's vegetative index (VI), stroke volume (UO), and minute blood-circulation volume (MOK) in accordance with Starr (1954), the average dynamic pressure (AD sr.), the "double-take" heart-beat rate indicator for the systolic arterial pressure (DP), and the total peripheral vascular resistance (OPS) in accordance with N. N. Savitskiy (1974). The data obtained were processed by statistical-analysis methods, including the use of variation coefficients. In order to refine the functional state of the cardiovascular system, Martin's exercise tolerance test was used.

The results of the research are presented in the table.

At-rest studies made at the start of the rotation period established that the main cardiovascular system indicators were within the range of the upper limits of the functional norm for all the worker vocational groups studied.

Changes of the systolic and diastolic arterial pressures at the end of the rotation, when compared with the commencement of that period, were marked by tendencies toward a reduction of these indicators for workers at the substructure portal, the pump station and the MKO. Reduction of arterial pressure is confirmed also by reduction of the OPS by 17, 9 and 7 percent, respectively. The reduction of OPS can be explained by reduction of the tension of blood vessels (arterioles and capillaries) under intense noise; it reflects one of the mechanisms of change of arterial pressure that is in agreement with the data of the literature (Ye. Ts. Andreyeva-Galanina and co-authors, 1972).

Heart-beat rate studies showed that at the end of the rotation period this indicator had not changed for the portal workers, but Kerdo's calculated vegetative index was 0; in the diesel-motor operator's group, a small tendency was noted toward an increase in the heart-beat rate, and the VI value, remaining negative, was reduced somewhat; the pump mechanics showed a heart-beat rate increase of 6 strokes per minute and the VI became positive, that is, the increase in heart-beat rate for this group is explained by the predominance of the sympathetic effect of the vegetative nervous system on the cardiovascular system.

The minute volume of blood circulation plays an essential role in maintaining the body's homeostasis. At the end of the rotation period the MOK had increased by 10 percent for substructure-portal drilling workers as a

Dynamics of ChSS [Heart-Beat Rate] System and of Systolic Arterial Pressure,  
at Rest and after Administration of the Martin Exercise Tolerance Test

Место работы (1)	Время смены (2)	ЧСС (уд/мин) (3)			АД сист. (мм рт. ст.) (4)		
		покой (5)	проба Мартине (6)	восстановление (7)	покой (5)	проба Мартине (6)	восстановление (7)
Подвыше- ный портал (8)	Начало (11)	80,6±2,6	102,4±5,8	87,8±5,8	128,0 ± 5,33	141,0 ± 6,71	138,0 ± 8,1
	Конец Коэф. вар. (12)	80,8±2,4 2%	114,0±6,61	91,2±5,4	125,0 ± 4,9 11%	144,5 ± 6,2	136,5 ± 5,7
Насосная (9)	Начало (11)	79,9±3,8	114,0±5,8	89,5±0,5	128,75±7,0	143,75±13,34	131,25±12,1
	Конец Коэф. вар. (12)	85,5±4,9 10%	123,0±14,5	92,0±3,0	127,5 ± 7,2 9%	145,0 ± 8,5	136,25±9,7
МКО (10)	Начало (11)	80,0±5,3	112,0±9,7	87,0±4,8	128,75±4,49	152,5 ± 6,06	136,25±8,5
	Конец Коэф. вар. (12)	80,5±3,0 6%	110,0±13,6	93,0±4,8	126,25±11,3 15%	140,0 ±12,1	140,0 ±15,7

Key:

1. Workplace.
2. Time of rotation period.
3. Heart-beat rate (strokes per minute).
4. AD [arterial pressure] systolic (mm of mercury column).
5. At rest.
6. The Martin Exercise Tolerance Test.
7. Recovery.
8. The substructure portal.
9. The pump station.
10. The MKO [machinery and boiler department].
11. The start.
12. The end.  
Coefficient of variation.

result of an increase in stroke volume, and of 14.7 percent for the pump mechanics as the result of a small increase in heart-beat rate and of the UO in this group. No change was noted in the MOK for the diesel-motor operators.

Changes in the cardiovascular system indicators during the Martin exercise tolerance test pointed to substantial stress of the systems that regulate functioning of the circulation in all the job groups. Both at the beginning and at the end of the rotation, the heart-beat rate indicators did not recover in 3 minutes after the Martin exercise tolerance test, while the heart-beat rate increased from 29 to 42 strokes per minute (the norm is less than 20 strokes per minute) during the Martin exercise tolerance test. The systolic arterial pressure did not recover for any one job group of the workers. The most pronounced changes during conduct of the Martin exercise tolerance test were found in the diesel-motor operators group, which apparently is explained by the greater stress that an extraordinary noise load had created on their circulatory system.

At the end of the rotation period, during conduct of the Martin exercise tolerance test, the MOK increased for the portal and pump-workers groups and decreased by 4.7 percent for the diesel-motor operators. Decrease of the MOK for the diesel-motor operators was an unfavorable sign, which points to an appearance of overexertion of the cardiovascular system and the negative influence of intense noise at the MKO on the cardiovascular system.

Changes of the DP indicator, that is, of an indirect indicator of the efficiency of the myocardium's oxygen consumption, point to a 2-percent reduction of this indicator at the end of the rotation for the portal workers group, a 1 percent reduction for the MKO workers, and a 6 percent increase of the DP indicators for the pump mechanics. Reduction of the DP during conduct of the Martin exercise tolerance test points to a certain reduction in myocardium efficiency in the groups investigated, which (in addition to what was set forth previously) indicates a pronounced stress of the functioning of the cardiovascular system on the part of the diesel-motor operators. Still more convincing was the reduction of the DP indicator at the end of the rotation when the Martin exercise tolerance test was conducted for the diesel-motor operators; it was reduced here by 8 percent, while in the other groups an increase of this indicator occurred. The worsening of myocardium efficiency in the diesel-motor operators group can be explained, apparently, by an excessive noise load. When it is considered that the effect of noise increases the discharge into the blood of catecholamines, which sharply increase the tissues' demand for oxygen, it becomes clear that the oxygen deficit in the myocardium can, under these circumstances, be extremely important, and this, in turn, can provoke the development of functional and even of pathological changes in the myocardium (K. Nedelcheva and co-authors, 1977).

An analysis of the indicators of the variation coefficients for the basic functional indicators of the cardiovascular system also testifies to the great stress on the cardiovascular system of the diesel-motor operators in comparison with the other job groups. Despite similar fluctuations in physiological indicators for the dynamics of the work week, the coefficients of variation were higher precisely in the group of MKO workers.

Thus, the data obtained permit certain conclusions to be drawn:

1. The studies that were made of the status of the cardiovascular systems of workers on noisy jobs on the SPBU "Baky" at the start of the rotation period showed that the basic functional indicators--the AD syst., the AD diast., and the ChSS--were within the upper limits of the functional norms.
2. A tendency toward a reduction in the systolic and diastolic arterial pressure was manifested, which occurs as a result of reduction of the OPS, as a responding reaction by the blood vessels to an intense noise load, was found at the end of the rotation period in the portal, pump and MKO personnel who work at places where there is an intense noise load.
3. Changes in the cardiovascular system indicators when Martin exercise tolerance tests were conducted at the end of the rotation period point to pronounced stress of the systems that regulate the functioning of the circulation in all the vocational groups of SPBU "Baky" workers that were studied. The most pronounced changes in the cardiovascular system were manifested by the diesel-motor operators.

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CSO: 1822/271

## GENERAL

### PRODUCTION SHORTFALLS IN ENAMEL-INSULATED WIRE NOTED

Moscow MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE in Russian No 5, May 83 pp 19-22

[Article by D. Yegorov, inspector, USSR People's Control Committee, Moscow: "Irreplaceable Losses: Why Is Enameled Wire in Short Supply?"]

[Text] In conditions of highly-specialized production, meeting contractual obligations to the letter by each and every enterprise is a most important condition for successful development of all industrial production.

Industrial products differ greatly from one another by degree of disposition in depth, if one may be permitted to employ this term, and scale of co-production. There are materials and component parts whose influence on production is confined within a given plant or association. But there are also many items the manufacture of which, from the standpoint of subcontractor co-production, is of determining significance for many sectors of the economy. Enameled wire is precisely such an item, involving substantial, comprehensive and multiple-stage co-production. It would be difficult today to name a single branch of production which does not employ enameled wire on a large scale.

Here is just one example. The Vladimir Electric Motor Plant is one of numerous customers to whom the Pskov Cable Plant once failed to deliver enameled wire as specified by contracts and orders. The customer plant failed to deliver electric motors to the Yelets Machine Building Plant. The latter in turn failed to deliver equipment to leather and shoe industry enterprises in Leningrad, Kuznetsk, Dzhambul, and other cities. There is no need to explain that these enterprises also failed to supply large quantities of consumer goods to the nation's economy.

And yet the cable industry very frequently fails to meet deliveries not for one or two customers, but for hundreds. One can imagine the losses sustained by our nation through the fault of this industry alone.

One cannot state that Minelektrotekhprom [Ministry of Electrical Equipment Industry] is unaware of the adverse state of affairs at our cable plants. In the last two years the ministry board has in its decisions time and again drawn the attention of the head of the Soyuzelektrokabel' All-Union Industrial Association to the need to take decisive steps to correct the situation and has specified fairly decent measures, but these measures have most frequently not been implemented due to weak oversight.

For many years now production targets have been achieved by the industry at 96-98 percent, while goods delivery target fulfillment has been worse. The enameled wire production growth rate is much slower than the growth rate of those industries which consume this product. During the years of the 10th Five-Year Plan enameled wire production increased by only 8.4 percent, while manufacture of fine enameled wire, which is in the shortest supply in this country, was growing at an even slower rate. Manufacture of heat-resistant enameled wire for mechanized winding of series 4A electric motors, refrigerator compressor motors, and color TV set disconnect systems has been growing at a particularly unsatisfactory rate in recent years. And yet extensive employment of heat-resistant wire generates considerable savings of copper.

The slow rate of growth of enameled wire manufacture is holding back production in many industries. In the last 2 years, for example, Minelektrotekhprom enterprises have undersupplied enameled wire by hundreds of tons (an approximately 17 percent shortfall) just to automotive industry plants. The result has been failure to manufacture approximately 1 million electric motors, more than 26,000 generators, and 300,000 rubles worth of other automotive electrical equipment.

Minelektrotekhprom is also guilty of similar delivery shortfalls to other branches of the economy, including agriculture. The Tallinn Volta Plant, for example, because of a lack of enameled wire, failed to supply almost 7,000 electric motors to the Yelgavsel'mash Plant of Minzhivmash [Ministry of Machine Building for Animal Husbandry and Fodder Production]. The latter plant in turn failed to deliver to agriculture approximately 3,000 scraper conveyers and more than 5,000 equipment drive units for livestock operations.

An examination of the situation indicates that the lag in manufacture of enameled wire is not due to objective causes over which the industry has no control. The causes involve primarily serious deficiencies in organization of production, a poor technical level and unsatisfactory utilization of existing equipment.

Process equipment was being utilized particularly unsatisfactorily (at a level of 60 percent) at the Pskov Cable Plant. It was not being maintained and repaired on a prompt and timely basis. For this reason a large number of existing enameling units (11 out of 33) and wire drawing machines have become unserviceable after 8 years in operation. Maintenance schedules were not met due to a lack of maintenance personnel. There are 39 units of uninstalled equipment at the plant, 19 of which have been waiting for installation since 1972. Parts and components are missing from 13 of these units of equipment.

Officials of the Soyuzelektrokabel' All-Union Industrial Association are sometimes concerned not so much by the actual state of affairs as for the appearance that everything is satisfactory. A great many facts confirming this were revealed as a result of the inspection and audit. In 1980, for example, construction crews failed to bring new enameled wire production facilities on-stream in a prompt and timely manner. But the statistical reports included as on-line uncompleted facilities with a manufacturing capacity of 9,000 tons of enameled wire. On the basis of these phony figures, the association assigned



the plant a production target for the nonexistent production capacity. As a result, customer orders were only 60-percent met. The wave of failures to meet production targets spread throughout the country like the ripples caused by a stone thrown onto a water surface. That production capacity which was incorporated into the plant's plan for 1981 did not come on-line until 30 December of that year.

The Pskov Cable Plant lacked warehouses and storage areas. Metal, copper and aluminum wire rod, varnishes and lacquers, crating and packaging materials, and uninstalled equipment were scattered all over the plant site and beyond. The inspection also noted that there was a lack of proper recordkeeping on inventory.

No measures were taken, however, to put things in proper order by N. Gevondyan, former director of the Pskov Cable Plant. Instead of bringing the plant director strictly to account, the head of the Soyuzelektrokabel' All-Union Industrial Association, I. Greblov, permitted him to transfer to another enterprise within the industry, to another executive position. This attitude toward the plant naturally could not help keep plant specialist personnel. Personnel turnover at the plant is running approximately 25 percent. Workers who have been employed 10-15 years at the plant do not want to continue working there, since new housing is not being completed, there are no children's preschool facilities, and no work is being done to improve working conditions and employee services.

The manufacture of enameled wire involves particularly difficult working conditions. The problem of securing worker cadres for enameled wire manufacture is difficult at best, and is particularly acute in present conditions.

Analysis of the numerical size and demographic composition of enameling workers indicates that approximately 80 percent of this category of workers are women, approximately 40 percent of whom are above 35 years of age. Only 6.8 percent of the total are under 20 years of age. This is clearly insufficient.

At the Moskabel' and Sibkabel' production associations, at the Mikroprovod Plant, the Rybinsk Cable Plant and several others, where manufacture of enameled wire was set up more than 20 years ago, the situation is particularly poor as regards addition of new blood to enameling worker personnel. Approximately 14 percent of workers are 25 years of age or less. In many instances (at the Rybinsk Cable Plant, Mikroprovod, Liyetkabel', Kirgizkabel', and Moldavkabel', for example) there is observed a steadily growing shortage of personnel. The rate of labor turnover is particularly high among young people.

Under these conditions particular attention should be focused on resolving social problems at cable plants. Insufficient attention, however, is being devoted to these matters.

The CPSU Central Committee decree entitled "On Measures to Ensure Fulfillment of Construction Plans for Housing and Social-Services Facilities" notes that newly-built production facilities are not always able to obtain a full workforce due to a shortage of housing. There is continuing noncoordinated planning

and construction of industrial enterprises, housing and social-services facilities, which leads to considerable difficulties in securing skilled cadres and to considerable production losses.

These shortcomings also apply in full measure to cable industry enterprises, and we believe that the Ministry of Electrical Equipment Industry will radically alter its attitude toward the social-services problems of these enterprises. The inspection conducted by the USSR People's Control Committee revealed serious shortcomings in utilization of process equipment at many cable plants. Approximately 65 percent of the equipment in enameled wire production as a whole is obsolete and requires replacement on the one hand and at the same time special schedules of preventive current maintenance and major overhauls.

The unsatisfactory state of equipment and the fact that operations are short of production workers are leading to a situation where the facilities at the majority of Minelektrotekhprom plants are being utilized unsatisfactorily. At the Kamokabel' Plant, for example, production facilities are being used at only 72 percent, and at 79 percent at the Moskabel' Plant. Full utilization of production capacity at just these two plants would be equivalent to bringing a new cable plant on-line. But the ministry is proceeding by a different, easier path. It is setting up new small-capacity shops and sections for the manufacture of enameled wire at enterprises of other all-union administrative associations which do not specialize in the manufacture of these products. We feel that such a practice in order to boost enameled wire production is not the proper solution to the situation.

The inspection also revealed substantial shortcomings in organization of production planning and distribution of enameled wire.

Tonnage continues to remain a principal plan indicator in physical terms in the cable industry. In order to boost this performance indicator, enterprises sometimes manufacture heavier wire to the detriment of contractual obligations. In 1981, for example, the Tskhinvali Emal'provod Plant, while failing to meet its year's production target for the manufacture of light-gauge wire, at the same time overfulfilled by 267 tons its target for large-diameter (from 1.01 to 1.56 mm) enameled wire, while having no contracts or orders for such product items. The situation is similar at other plants. The Sibkabel' Production Association, for example, over the period of the last 10 years has regularly failed to meet its production targets on light-gauge enameled wire up to 0.35 mm in diameter, cutting production almost in half, although the needs of the national economy in wire of these gauges are being met least of all.

Last year, in order to give enterprises incentive to increase the manufacture of light-gauge wire, wholesale prices on this wire were substantially raised. This has not significantly altered the situation, however. The fact is that worker piece rates remain low in the manufacture of this wire. Light gauges continue to be "unprofitable" product items. And yet labor input in the manufacture of a ton of 1 mm wire, for example, is more than 10 times less than that in the manufacture of 0.1 mm wire.

In these conditions other physical-terms indices should be adopted. We feel that one should consider standard tons and labor input conversion factors, so that wire of any diameter will be equally profitable to a cable plant in production planning and work-loading.

Our inspection revealed that unwarranted adjustments of quarterly production plans occurred at all enterprises, and plan targets were adjusted to fit actual achieved figures. The industrial association changed plans 18 times in 1981 for the Pskov Cable Plant, for example. Nor did the situation change much last year. And frequently the validity of these adjustments could not stand up to criticism. The following justification was given for one such adjustment -- lack of electric power and aluminum. In actual fact, as our inspection revealed, the plant did not experience any downtime last year for this reason. Some months planners get so "daring" that a plant's plan is reduced to an unrealistically low level. In March of last year, for example, to judge from plan documents, the plant did not have to operate at all, since the production volume target for that month was reduced to zero, although in actual fact the plant operated that month the same as during other months.

A localistic preference approach was frequently displayed by the ministry in setting up delivery schedules. It instructed cable plants to give priority in supplying electrical equipment industry enterprises with enameled wire. This is why the level of contract fulfillment by this industry's enterprises is much higher than that of customers in other branches and sectors of the economy. The Zakavkazkabel' Production Association, for example, met its intraministerial deliveries last year by 96.7 percent, while the figure was lower for other customers, even "priority" customers. Deliveries to the Central-Chernozem Main Territorial Administration of USSR Gosstab, for example, were met by only 67.2 percent, while the figure was 57.6 percent for the Kazglavsel'khozkomplekt supply depot.

Many industry enterprises have amassed positive experience as well in organizing production and sale of their products. Dissemination of this experience could generate appreciable effect. Delivery targets at the Rybinsk Cable Plant are assigned not only to shops but also to sections and brigades. Brigade organization of labor has made it possible substantially to boost the level of meeting deliveries. This experience, however, is not becoming a common asset. At the Sibkabel' Association, for example, brigades have not been formed in the finest-gauge wire drawing section. Piece-rate earnings fail to provide workers with incentive to do a better job.

Wire enameling machines in the cable industry are operated for the most part by women. It is particularly important here to make machinery perform heavy physical work. It is high time to design and build equipment with which female workers can mount on and remove from enameling machines the heavy -- weighing more than 50 kg -- cable reels. This has been discussed for quite some time now, but the All-Union Scientific Research and Design Engineering Institute for the Cable Industry is in no hurry to solve this problem.

Cable plants experience great difficulties in shipping enamel-insulated wire. Many customer orders, due to the fact that these orders are too small to meet the direct shipping standard, stand around for months on end in the manufacturer's warehouse waiting for shipping space and cannot be promptly shipped off to the customers.

Soyuzglavkabel' could perform an important organizing role in this area, working to consolidate customer orders. The fact is that at many cable plants approximately 30 percent of the orders are below direct shipment standards. And, strange as it might seem, it is the organizations of USSR Gosplan which most frequently sent in orders below direct shipment standards, while it is these organizations which are called upon to wage a campaign to consolidate shipments. Last year, for example, the North Caucasus Main Territorial Administration sent the Rybinsk Cable Plant seven orders, each of which was below the direct shipment standard.

Special terms are currently being formulated for shipping cable products. We feel that under the circumstances there should also be provision for increasing the direct shipment standard for shipping enamel-insulated wire.

Many plants in the cable industry are short of packing materials -- spools for enamel-insulated wire. Many enamel-coating machines frequently stand idle for this reason. The industry is seriously in need of assistance by the Ministry of Chemical Industry and USSR Gosplan for providing enterprises of the electrical equipment industry with heat-resistant varnishes and high-impact polystyrene for making spools.

The results of the inspection of cable plants were examined at a meeting of the USSR People's Control Committee, which noted in its decision serious deficiencies in organizing accomplishment of plan targets, manufacture and utilization of equipment. The people at Minelektrotekhprom should correct deficiencies and improve the operations of cable industry enterprises.

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